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

دليل وصف البرنامج الأكاديمي والمقرر

2026

نموذج وصف البرنامج الأكاديمي

اسم الجامعة: جامعة ...اوروك.....

الكلية/ المعهد: الكلية ..التقنية الهندسية.....

القسم العلمي: قسم ..هندسة تقنيات الاتصالات.....

اسم البرنامج الأكاديمي او المهني: بكالوريوس .....

اسم الشهادة النهائية: بكالوريوس في .هندسة تقنيات الاتصالات.....

النظام الدراسي: نظام مسار بولونيا

تاريخ اعداد الوصف: 2026/6/27

تاريخ ملء الملف: 2026/2/12

التوقيع :

اسم رئيس القسم: أ.د. سلطان الجفاجي

التاريخ : 2026/6/27

دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي: أ.م.د حامده حميد خضير

التاريخ 2026/6/27

التوقيع

مصادقة السيد العميد

ا.د. وليد امين محمود الجوهر

1. رؤية البرنامج

يسعى القسم الى تحقيق التميز ومواكبة التطور في مجال هندسة تقنيات الاتصالات وتهيئة واعداد الملاكات الفاعلة والضرورية لسد الحاجة المتنامية في سوق العمل . يسعى القسم دائما الى مواكبة سوق العمل والاحتكاك بشركات القطاع الخاص والعام في مجال الانترنت من خلال اقامة الورش والندوات والزيارة العلمية

تتجه المناهج الدراسية في قسم هندسة تقنيات الاتصالات نحو تهيئة واعداد ملاكات هندسية متميزة قي مجال هندسة الاتصالات قادرة على الايفاء بمتطلبات سوق العمل في هذا المجال كما يساهم في التعاون مع الجهات العاملة في الاتصالات لتطوير البنى التحتية للاتصالات في البلد كما يحاول القسم خلق بيئات للتعاون مع الجامعات الاخرى و المؤسسات الاكاديمية المرتبطة بهذا الاختصاص ، ويستطيع خريجو القسم العمل في الدوائر الحكومية ومؤسسات الدولة ضمن مجال اختصاصهم او العمل في القطاع الخاص ضمن شركات الهاتف النقال او شركات خدمات الشبكة الدولية للمعلومات او كمهندسي شبكات في تصميم وبناء وادامة العمل في مراكز المعلومات في مؤسسات القطاعين العام والخاص كافة

2. رسالة البرنامج

يسعى الكادر التدريسي في قسم هندسة تقنيات الاتصالات / الكلية التقنية الهندسية / جامعة أوروك إلى تقديم تعليم أكاديمي وتقني متكامل يزوّد الطلبة بالمعرفة الأساسية في تقنيات وأنظمة الاتصالات الحديثة، مع إتاحة فرص التعمق في مجالات تخصصية تشمل شبكات الاتصالات، ومعالجة الإشارة، والأنظمة السلكية واللاسلكية.

وقد صُمم المنهج الأكاديمي والإرشاد العلمي لإعداد خريجين مؤهلين لمستقبلهم المهني، سواء للعمل ككوادر هندسية كفوءة في تصميم وتشغيل وصيانة وإدارة شبكات وأنظمة الاتصالات، أو لمواصلة الدراسات العليا في مجال هندسة تقنيات الاتصالات.

كما يهدف البرنامج إلى دعم البحث العلمي والابتكار من خلال تزويد الطلبة بالمعرفة العلمية والتقنية اللازمة لتطوير حلول اتصالات متقدمة تلبي متطلبات العصر الرقمي والتحول التكنولوجي. ويعمل القسم على إعداد كوادر متميزة علميًا ومهاريًا وسلوكيًا في مجال تقنيات الاتصالات، مع مواكبة التطورات العلمية في الجامعات العالمية، وتقديم خدمات مجتمعية تعتمد على أحدث المناهج الدراسية، بما يسهم في بناء بيئة أكاديمية متقدمة.

3. اهداف البرنامج

1. تزويد خريجي البرنامج بالمهارات العلمية والعملية اللازمة لتشخيص الأعطال في أنظمة وشبكات الاتصالات بكفاءة واحترافية.
2. تأهيل الطلبة لفهم مكونات أنظمة الاتصالات المختلفة والتعامل معها بفعالية، مع مواكبة التطورات التكنولوجية الحديثة في هذا المجال.
3. القدرة على التصميم بإستخدام أحدث برامج التصميم والمحاكاه
4. إكساب الطلبة معرفة تفصيلية بالتقنيات الحديثة المستخدمة في هندسة تقنيات الاتصالات، بما في ذلك الشبكات والأنظمة اللاسلكية ومعالجة الإشارة.
5. تنمية قدرات الخريجين على إجراء عمليات التحديث والتطوير لأنظمة الاتصالات بما يتوافق مع احتياجات المؤسسات وسوق العمل.
6. سعي القسم لتحقيق معايير الجودة الأكاديمية في التعليم والبحث العلمي بما يتناسب مع الإمكانيات المتاحة ومتطلبات التطور التقني .
7. ان يبدي الطالب اهتماماً بالمشاكل الهندسية والتصاميم في انظمة الاتصالات والحاسبات وامكانية ايجاد الحلول.
8. التفكير والمناقشة لتطوير التصاميم والانظمة الهندسية في مجال التخصص.
9. تشكيل مجاميع من الطلبة لمعالجة المشاكل الهندسية في مجال التخصص.
10. استخدام العصف الذهني في اخراج الافكار الابداعية لبعض الطلبة الموهوبين.

4. الاعتماد البرامجي

5. المؤثرات الخارجية الأخرى

وزارة التعليم العالي والبحث العلمي العراقية

6. هيكلية البرنامج

هيكل البرنامج	عدد المقررات	وحدة دراسية	النسبة المئوية	ملاحظات *
مقررات أساسية (تمهيدية/أساسيات علمية)	16	68	28.3%	
مقررات تخصصية رئيسية (جوهر البرنامج)	27	158	65.8%	
مقررات داعمة أو ذات صلة بالتخصص	7	14	5.8%	
مقررات اختيارية	0	0	0	
التدريب الصيفي	**2**	**بدون وحدات**		**التدريب للمرحلة الثانية والثالثة**

7. وصف البرنامج

الفصل الأول | عدد الوحدات 30 | الوحدة = 30 ساعة

المتطلب السابق	نوع المادة	عدد الوحدات	ساعات غير مجدولة	ساعات مجدولة	اسم المادة الدراسية	رمز المادة
	ساندة	2	32	18	لغة انكليزية 1	ATUU113
—	اساسية	3	27	48	حاسوب	ATUU1111
—	اساسية	5	62	63	رياضيات 1	ATU11103
—	تخصصية	7	82	93	دوائر التيار الكهربائي المستمر	ATU11104
—	تخصصية	7	82	93	الفيزياء واشباه الموصلات	ATU11105
—	ساندة	2	17	33	حقوق الانسان والديمقراطية	ATU11

الفصل الثاني | عدد الوحدات 30 | الوحدة = 30 ساعة

المتطلب السابق	نوع المادة	عدد الوحدات	ساعات غير مجدولة	ساعات مجدولة	اسم المادة الدراسية	رمز المادة
—	ساندة	2	32	18	اللغة العربية	ATUU112
—	اساسية	5	62	63	رياضيات 2	ATU11208
—	تخصصية	6	72	78	دوائر التيار الكهربائي المتناوب	ATU11209
—	تخصصية	7	82	93	الرقمية	ATU11210
—	تخصصية	7	82	93	الدوائر الالكترونية	ATU11211
—	اساسية	3	27	48	معامل	ATU11212

الفصل الثالث | عدد الوحدات 30 | الوحدة = 30 ساعة

المتطلب السابق	نوع المادة	عدد الوحدات	ساعات غير مجدولة	ساعات مجدولة	اسم المادة الدراسية	رمز المادة
—	تخصصية	6	72	78	تصميم الدوائر الالكترونية	ATU11301
—	تخصصية	6	72	78	الاشارات والانظمة	ATU11302
—	تخصصية	4	52	48	المجالات الكهرمغناطيسية الثابتة	ATU11303
—	اساسية	5	62	63	نمذجة الانظمة رياضيا	ATU11304

ATU11305	تصميم الدوائر الرقمية	78	72	6	تخصصية	—
ATU11306	لغة البرمجة فيشول بيسك	48	27	3	اساسية	—

الفصل الرابع | عدد الوحدات 30 | الوحدة = 30 ساعة

رمز المادة	اسم المادة الدراسية	ساعات مجدولة	ساعات غير مجدولة	عدد الوحدات	نوع المادة	**المتطلب السابق**
ATU222	حاسوب2	48	27	3	اساسية	—
ATU11408	معادلات تفاضلية	63	112	7	اساسية	—
ATUU211	جرائم حزب البعث	18	32	2	ساندة	—
ATU11410	اتصالات تناظرية	78	97	7	تخصصية	—
ATU11411	دوائر إلكترونية متكاملة	78	97	7	تخصصية	—
ATU221	لغة انكليزية 2	18	32	2	ساندة	—

الفصل الخامس | عدد الوحدات 30 | الوحدة = 30 ساعة

رمز المادة	اسم المادة الدراسية	ساعات مجدولة	ساعات غير مجدولة	عدد الوحدات	نوع المادة	**المتطلب السابق**
ATU11501	التحليلات الهندسية	63	62	5	اساسية	—
ATU11502	الاحتمالية والاحصاء	48	52	4	اساسية	—
ATU11503	هوائيات وانتشار موجات	78	72	6	تخصصية	—
ATU11504	الاتصالات الرقمية	63	87	6	تخصصية	—
ATU11505	معالج دقيق	93	57	6	تخصصية	—
ATU11506	برمجة ماتلاب	63	12	3	اساسية	—

الفصل السادس | عدد الوحدات 30 | الوحدة = 30 ساعة

رمز المادة	اسم المادة الدراسية	ساعات مجدولة	ساعات غير مجدولة	عدد الوحدات	نوع المادة	**المتطلب السابق**
ATU11607	التحليلات العددية	48	52	4	اساسية	—
ATU11608	نظرية المعلومات	48	77	5	تخصصية	—
ATU11609	معالجة الاشارة الرقمية	48	102	6	تخصصية	—

—	تخصصية	6	87	63	الياف ضوئية	ATU11610
—	تخصصية	6	72	78	مسيطر دقيق	ATU11611
—	اساسية	3	12	63	لغة برمجة باثيون	ATU11612

الفصل السابع | عدد الوحدات 30 | الوحدة = 30 ساعة

المتطلب السابق	نوع المادة	عدد الوحدات	ساعات غير مجدولة	ساعات مجدولة	اسم المادة الدراسية	رمز المادة
—	تخصصية	7	82	93	شبكات الحاسبات	ATU11701
—	تخصصية	4	52	48	اتصالات لاسلاكية	ATU11702
—	تخصصية	6	87	63	اتصالات ضوئية	ATU11703
—	اساسية	7	82	93	سيطرة	ATU11704
—	اساسية	4	37	63	إدارة مشاريع	ATU11705
—	ساندة	2	17	33	اخلاقيات المهنة	ATU11706

الفصل الثامن | عدد الوحدات 30 | الوحدة = 30 ساعة

المتطلب السابق	نوع المادة	عدد الوحدات	ساعات غير مجدولة	ساعات مجدولة	اسم المادة الدراسية	رمز المادة
—	تخصصية	6	87	63	ذكاء صناعي	ATU11807
—	تخصصية	4	67	33	اتصالات اقمار صناعية	ATU11808
—	تخصصية	4	52	48	أمن سبراني	ATU11809
—	تخصصية	6	87	63	اتصالات نقالة	ATU11810
—	تخصصية	6	57	93	صيانة أجهزة اتصالات	ATU11811
—	تخصصية	4	37	63	المشروع	ATU11812

8. مخرجات التعلم المتوقعة للبرنامج

سيمتلك الطلاب الذين يُكملون برنامج هندسة تقنيات الاتصالات (CET) أساسًا متينًا في أنظمة الاتصالات، وشبكات الاتصالات السلكية واللاسلكية، والتقنيات اللاسلكية، ومعالجة الإشارات، وتقنيات المعلومات الحديثة. وسيكون الخريجون على دراية ومهارة في تحليل وتصميم وتنفيذ وتشغيل وصيانة أنظمة وشبكات الاتصالات. بالإضافة إلى ذلك، سيفهمون الدور الحيوي لتقنيات الاتصالات في دعم التنمية الاقتصادية والنمو الصناعي والتحول الرقمي.
سيتمكن الخريجون من استخدام أدوات الهندسة الحديثة، وتطبيقات البرمجيات، والإنترنت، وتقنيات الاتصالات لجمع المعلومات التقنية وتحليلها وعرضها وفقًا للمعايير الأكاديمية والمهنية. وسيُظهرون كفاءة في العمل الجماعي، وحل المشكلات، والتفكير النقدي، والتعلم المستمر. علاوة على ذلك، سيمتلكون مهارات تواصل شفهية وكتابية فعّالة، مما يُمكّنهم من التفاعل باحترافية مع المهندسين والفنيين والعملاء وغير المتخصصين في بيئات عمل متنوعة.

المخرج 1 – فهم المعارف المرتبطة
سيُظهر الخريجون فهمًا شاملًا لمبادئ هندسة الاتصالات، والتقنيات الناشئة، ومتطلبات الصناعة، والممارسات المهنية. سيتعرف الخريجون على أحدث التوجهات والتطورات في مجالات الاتصالات السلكية واللاسلكية، والشبكات، والاتصالات اللاسلكية، وتقنيات المعلومات، مما يُمكّنهم من التكيف مع احتياجات سوق العمل المتغيرة.

المخرج 2 – التواصل الشفوي والكتابي
سيتمكن الخريجون من توصيل المعلومات التقنية، ونتائج المشاريع، وتصاميم الشبكات، ونتائج استكشاف الأخطاء وإصلاحها بفعالية، من خلال عروض تقديمية شفهية احترافية، وتقارير فنية، ووثائق مكتوبة مناسبة لكل من الجمهور التقني وغير التقني.

المخرج 3 – المهارات التقنية والمعرفية
سيكون الخريجون قادرين على تحليل وتصميم وتنفيذ واختبار وصيانة أنظمة وشبكات الاتصالات. سيطبقون المبادئ الهندسية وأدوات البرمجيات الحديثة لتطوير حلول في مجالات الاتصالات السلكية واللاسلكية، ونقل البيانات، ومعالجة الإشارات، وإدارة الشبكات، وفقًا للمتطلبات والمعايير التقنية المحددة.

المخرج 4 – التفكير النقدي ومهارات التحليل
سيتمكن الخريجون من تحديد وتحليل التحديات الناشئة في أنظمة وشبكات الاتصالات، وتطوير حلول هندسية فعّالة باستخدام التفكير المنطقي، والتفكير النقدي، والنمذجة، والمحاكاة، وتصميم الأنظمة، وتقنيات تقييم الأداء.

المخرج 5 – أدوات وتقنيات البحث المناسبة
سيتمكن الخريجون من إجراء البحوث العلمية والهندسية باستخدام منهجيات البحث المعتمدة وأدوات التحليل الحديثة. كما سيتمكنون من اكتساب مهارات تقنية جديدة، والتكيف مع التقنيات المتطورة، وتطبيق أساليب مبتكرة لتحقيق النتائج الهندسية المرجوة.

المخرج 6 – مهارات الاتصال وتكنولوجيا المعلومات
سيتمكن الخريجون من تبادل المعلومات التقنية بفعالية ضمن فرق هندسية متعددة التخصصات للوصول إلى الحلول الأمثل. وسيكونون بارعين في استخدام تقنية المعلومات، وشبكات الاتصالات، وتطبيقات البرمجيات، وموارد الإنترنت. علاوة على ذلك، سيتمكنون من تفسير المعايير التقنية، وكتيبات المعدات، ووثائق الشبكات، والمواصفات الهندسية، مع التواصل بفعالية مع كل من الجمهور التقني وغير التقني باستخدام المصطلحات الهندسية المناسبة باللغة الإنجليزية.

المخرج 7 – القيادة والعمل الجماعي
سيُظهر الخريجون دافعية ذاتية، ومهارات قيادية، وقدرة على العمل التعاوني مع متخصصين من مختلف التخصصات والخلفيات. وسيكونون قادرين على إدارة المشاريع الهندسية، وحل المشكلات تحت الضغط، والتكيف مع المواقف المعقدة، والالتزام بأخلاقيات المهنة، ومعايير الجودة، ولوائح السلامة في بيئات الاتصالات والهندسة.

المخرج 8 – التطوير المهني الذاتي
سينخرط الخريجون في التعلم مدى الحياة والتطوير المهني المستمر لمواكبة التطورات في تقنيات الاتصالات. وسيُظهرون القدرة على اتخاذ قرارات مدروسة، وتخطيط وإدارة الأنشطة المهنية، وحل المشكلات الهندسية بشكل مستقل، والسعي وراء فرص التقدم الوظيفي، والحصول على الشهادات المهنية، والدراسات العليا

9. استراتيجيات التعليم والتعلم

•المحاضرات النظرية التفاعلية:(Interactive Lectures)
تُستخدم لشرح المفاهيم الأساسية والمتقدمة في هندسة الاتصالات من خلال العروض التقديمية والأمثلة والتطبيقات العملية.

•التعليم العملي والمختبري:(Laboratory and Practical Work)
يوفر خبرة عملية في أنظمة الاتصالات والشبكات والمعدات الإلكترونية لتطوير المهارات التقنية والعملية.

•المشاريع والتكليفات الهندسية:(Project-Based Learning)
يعمل الطلاب على مشاريع فردية وجماعية ، مما يعزز مهارات حل المشكلات والعمل الجماعي.

•النقاشات الصفية وورش العمل:(Class Discussions and Workshops)
تشجع على المشاركة الفعالة والتفكير النقدي وتبادل الأفكار والمعارف التقنية.

•التعلم الذاتي:(Self-Directed Learning)
يُشجع الطلاب على استخدام الموارد التقنية والمقالات البحثية والأدوات الرقمية لتوسيع معارفهم ومهاراتهم.

•العروض التقديمية والتقارير الفنية:(Presentations and Technical Reports)
تُنمي قدرة الطلاب على توصيل المعلومات التقنية بفعالية من خلال التقارير الكتابية والعروض الشفوية.

•الزيارات العلمية والتدريب الصيفي:(Site Visits and Summer Training)
توفر تجربة عملية في بيئات عمل الاتصالات والتكنولوجيا، وتربط المعرفة الأكاديمية بالممارسة المهنية

10. طرائق التقييم

صُممت أساليب التقييم المُستخدمة في برنامج تقنيات هندسة الاتصالات لتقييم مدى تحقيق الطلاب لمخرجات التعلم المرجوة على مستوى المقرر الدراسي والبرنامج ككل. وتُستخدم أدوات تقييم متنوعة لقياس معارف الطلاب وقدراتهم العملية ومهاراتهم التحليلية وكفاءاتهم في التواصل. وتشمل هذه الأدوات ما يلي:

1. امتحانات تحريرية لتقييم المعرفة والفهم النظري.
2. تقييمات معملية لتقييم المهارات العملية والتقنية في أنظمة وشبكات الاتصالات.
3. تقييمات قائمة على المشاريع لتقييم مهارات حل المشكلات والابتكار والعمل الجماعي.
4. عروض تقديمية شفهية وتقارير فنية لقياس مهارات التواصل وكتابة التقارير المهنية.
5. واجبات منزلية وتكليفات لتشجيع التعلم الذاتي والتطوير الأكاديمي المستمر.
6. المشاركة في المناقشات وورش العمل والندوات لتعزيز التفاعل والتفكير النقدي.
7. واجبات داخل الصف وذلك لحل التمارين الرياضية الهندسية على شكل مجاميع داخل قاعة المحاضرات النظرية او داخل المختبرات .
8. اكتساب الطالب لخبرة فحص مكونات الكارتات الالكترونية المكونة للأجهزة الالكترونية لمنظومات الاتصالات التماثلية والرقمية .

تدعم أساليب التقييم هذه التطوير المستمر للطلاب وتضمن تحقيق الكفاءات الأكاديمية والمهنية.

11. الهيئة التدريسية

أعضاء هيئة التدريس

اسم التدريسي	الرتبة العلمية	التخصص		المتطلبات/المهارات الخاصة (ان وجدت)		اعداد الهيئة التدريسية	
		عام	خاص			ملاك	محاضر
حسين كيطان منسي	أستاذ دكتور	علوم حاسبات	ذكاء اصطناعي و تعدين بيانات			ملاك	
علي حسين احمد الحديدي	أستاذ مساعد دكتور	هندسة كهربائية	سيطرة والكترونيات القدرة			ملاك	
الاء حميد علوان العبدالله	أستاذ مساعد دكتور	رياضيات	نظرية تقريب الدالي			ملاك	
ماجدة حميد مجيد	أستاذ مساعد دكتور	هندسة كهربائية	هندسة الالكترونيك والاتصالات			ملاك	
فهد محمد عبد الحسين الزبيدي	مدرس دكتور	هندسة الالكترونيك والاتصالات	هندسة الالكترونيك والاتصالات			ملاك (تفرغ علمي)	
الحاج الأمين بابكر	مدرس دكتور	علوم حاسبات	الامن السيبراني للبيانات الهائلة			ملاك	
نبراس جبار محمد	مدرس مساعد	هندسة كهربائية	هندسة القدرة الكهربائية			ملاك	
عامر عبدالله عباس	مدرس مساعد	هندسة كهربائية	الكترونيك			ملاك	
ريهام إسماعيل ابراهيم	مدرس مساعد	هندسة سيطرة ونظم	هندسة الحاسبات			ملاك	

11. التطوير المهني

توجيه أعضاء هيئة التدريس الجدد
تتبنى الكلية منهجًا متكاملًا لتوجيه أعضاء هيئة التدريس الجدد، حيث يتم تقديم برنامج توجيهي شامل يهدف إلى تسهيل عملية الاندماج في البيئة الأكاديمية والإدارية. يشمل هذا البرنامج جلسات تعريفية مُركّزة تعرّف الأعضاء الجدد على الهيكل التنظيمي، استراتيجيات التعليم والتعلم المتبعة في الكلية، الأنظمة الأكاديمية والإدارية، بالإضافة إلى التعريف بالخدمات المتوفرة داخل الحرم الجامعي. كما يتم تخصيص مشرفين أكاديميين لتوجيه أعضاء الهيئة التدريسية الجدد بشكل فردي، مع التركيز على تقديم الدعم المستمر والإجابة على استفساراتهم بما يضمن تكيّفهم السريع مع بيئة العمل الأكاديمي. لأعضاء هيئة التدريس الزائرين والمتفرغين، يتم تزويدهم بمعلومات موسعة حول المهام الأكاديمية المتوقعة والموارد المتاحة لهم لضمان أقصى درجات النجاح والفاعلية في أداء واجباتهم.
التطوير المهني لأعضاء هيئة التدريس
تهدف الكلية إلى تعزيز النمو المهني المستمر لأعضاء هيئة التدريس من خلال خطة شاملة تركز على تطوير استراتيجيات التدريس، الابتكار في أساليب التعليم والتعلم، وتقييم نتائج التعلم بما يتماشى مع أحدث الاتجاهات الأكاديمية العالمية. تتضمن الخطة تنظيم ورش عمل ودورات تدريبية دورية تغطي موضوعات متعددة، مثل تحسين كفاءة التدريس، استخدام التقنيات الحديثة في التعليم، طرق التقييم المبتكرة، وكذلك تطوير المهارات البحثية. كما تشجع الكلية على المشاركة في مؤتمرات وندوات أكاديمية محلية ودولية لتعزيز تبادل الخبرات والمعرفة المتخصصة. بالإضافة إلى ذلك، يتم تنفيذ آلية تقييم شاملة لأداء أعضاء الهيئة التدريسية، تتضمن ملاحظات من الطلاب والزملاء، مما يساهم في تقديم فرص تدريبية مخصصة بناءً على الاحتياجات الفردية. في هذا الإطار، تحرص الكلية على توفير بيئة تعليمية تدعم التطور المهني المستمر وتسهم في تحسين جودة الأداء الأكاديمي.

12. معيار القبول

يقبل الطالب في الكلية ضمن القبول المركزي في وزارة التعليم العالي والبحث العلمي

13. أهم مصادر المعلومات عن البرنامج

1. الملاك التدريسي في الكلية.
2. محاضرات التدريسيين.
3. مكتبة الكلية.
4. المكتبة الإلكترونية.
5. الكتب المنهجية.
6. الكتب المساعدة.
7. المواقع الإلكترونية والإنترنت.

14. خطة تطوير البرنامج

1. استخدام التعليم الالكتروني لأغراض تزويد الطالب بمعلومات إضافية لفهم مبادئ هندسة الاتصالات والشبكات والحاسبات.
2. التدريب في اقسام تقنيات الاتصالات في دوائر الدولة الحكومية مثل البريد وبدالات البريد والاتصالات بالإضافة الى الشركات الهندسية الحكومية والاهلية.
3. التدريب المهني الصيفي في مؤسسات هندسة الاتصالات والشبكات .
4. إعداد مشاريع التخرج ومتابعتها ومناقشتها بأسلوب يحاكي الرسائل والاطاريح الجامعية لتقوية الجانب المهاري البحثي لدى الطالب.

مخطط مهارات البرنامج الدراسي

الفصل الدراسي	رمز المادة	المادة الدراسية	نوع المادة الدراسية	المخرج 1	المخرج 2	المخرج 3	المخرج 4	المخرج 5	المخرج 6	المخرج 7	المخرج 8
الفصل الأول	ATUU113	لغة انكليزية 1	ساندة	✓		✓	✓	✓			
	ATUU1111	حاسوب	اساسية	✓	✓				✓	✓	✓
	ATU11103	رياضيات 1	اساسية	✓	✓		✓	✓	✓	✓	✓
	ATU11104	الدوائر الكهربائية المستمر	تخصصية	✓		✓	✓	✓	✓	✓	✓
	ATU11105	الفيزياء واشباه الموصلات	تخصصية	✓	✓	✓	✓	✓	✓	✓	
	ATU11	حقوق الانسان والديمقراطية	ساندة		✓				✓		
	ATU11107	الرسم الهندسي	اساسية	✓			✓				
الفصل الثاني	ATUU112	اللغة العربية	ساندة		✓						
	ATU11208	رياضيات 2	اساسية	✓	✓		✓	✓	✓	✓	✓
	ATU11209	الدوائر الكهربائية المتناوبة	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11210	الرقمية	تخصصية	✓			✓	✓			
	ATU11211	الدوائر الالكترونية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11212	معامل	اساسية	✓	✓	✓	✓	✓	✓	✓	✓
الفصل الثالث	ATU11301	تصميم الدوائر الالكترونية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11302	الاشارات والانظمة	تخصصية	✓		✓	✓	✓	✓		✓
	ATU11303	المجالات الكهرمغناطيسية الثابتة	تخصصية	✓		✓	✓	✓		✓	✓
	ATU11304	نمذجة الانظمة رياضيا	اساسية	✓	✓		✓	✓	✓	✓	✓
	ATU11305	تصميم الدوائر الرقمية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11306	لغة البرمجة فيشول بيسك	اساسية	✓	✓				✓	✓	✓
الفصل الرابع	ATU222	حاسوب2	اساسية	✓	✓				✓	✓	✓
	ATU11408	معادلات تفاضلية	اساسية	✓	✓		✓	✓	✓	✓	✓
	ATUU211	جرائم حزب البعث	ساندة		✓						
	ATU11410	اتصالات تناظرية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11411	دوائر إلكترونية متكاملة	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU221	لغة انكليزية 2	ساندة		✓						
	ATU220	اللغة العربية2	ساندة		✓						
الفصل الخامس	ATU11501	التحليلات الهندسية	اساسية	✓	✓		✓	✓	✓	✓	✓
	ATU11502	الاحتمالية والاحصاء	اساسية	✓	✓		✓	✓	✓	✓	✓
	ATU11503	هوائيات وانتشار موجات	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11504	الاتصالات الرقمية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓

	ATU11505	معالج دقيق	تخصصية	✓	✓				✓	✓	✓	✓
	ATU11506	برمجة ماتلاب	اساسية	✓	✓				✓	✓	✓	✓
الفصل السادس	ATU11607	التحليلات العددية	اساسية	✓			✓	✓	✓	✓	✓	✓
	ATU11608	نظرية المعلومات	تخصصية	✓			✓	✓	✓	✓	✓	✓
	ATU11609	معالجة الاشارة الرقمية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11610	الياف ضوئية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11611	مسيطر دقيق	تخصصية	✓	✓				✓	✓	✓	✓
	ATU11612	لغة برمجة باثيون	اساسية	✓	✓				✓	✓	✓	✓
الفصل السابع	ATU11701	شبكات الحاسبات	**تخصصية**	✓	✓				✓	✓	✓	✓
	ATU11702	اتصالات لاسلاكية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11703	اتصالات ضوئية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11704	سيطرة	اساسية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11705	إدارة مشاريع	اساسية		✓							
	ATU11706	اخلاقيات المهنة	اساسية		✓		✓					
الفصل الثامن	ATU11807	الذكاء الصناعي	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11808	اتصالات الاقمار الصناعية	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11809	الامن السيبراني	تخصصية	✓	✓				✓	✓	✓	✓
	ATU11810	اتصالات الموبايل	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓
	ATU11811	صيانة اجهزة الاتصالات	تخصصية	✓	✓	✓		✓	✓	✓	✓	✓
	ATU11812	المشروع النهائي	تخصصية	✓	✓	✓	✓	✓	✓	✓	✓	✓

وصف المقررات الدراسية

نموذج وصف المادة الدراسية

اللغة الانكليزية

Module Information معلومات المادة الدراسية					
Module Title	**English1**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☒ **Lecture**	
Module Code	ATU12				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGx		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Mohammed Salim		**e-mail**	E-mail	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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 course is to provide English learners with integrated language skills such as reading, listening and writing resulting in a level of basic language knowledge. 2-This course will focus on grammar rules, basic word knowledge and usage, reading comprehension, reading out of the lesson, and Paragraph writing. 3- A student may be able to listen to native speakers and speak English Language. 4- A student may be able to write and have creativity in his writing.
Module Learning Outcomes	1- Uses expressions of Quantity in elementary level of English.

مخرجات التعلم للمادة الدراسية	2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task. 3- Defines basic Modals and employ them in elementary level of communication and writing skills. 4- Translates sentences in elementary level from English to another language. 5- Interprets the texts written in elementary level of English.
Indicative Contents المحتويات الإرشادية	**Language** is a rule-governed behavior. It is defined as the comprehension and/or use of a spoken (i.e., listening and speaking), written (i.e., reading and writing), and/or **other communication symbol system** (e.g., American Sign Language). **Spoken and written language** are composed of receptive (i.e., listening and reading) and expressive (i.e., speaking and writing) components. Spoken language, written language, and their associated components (i.e., receptive and expressive) are each a synergistic system comprised of individual language domains (i.e., phonology, morphology, syntax, semantics, pragmatics) that form a dynamic integrative whole **Phonology** study of the speech sound (i.e., phoneme) system of a language, including the rules for combining and using phonemes. **Morphology** study of the rules that govern how morphemes, the minimal meaningful units of language, are used in a language. **Syntax** the rules that pertain to the ways in which words can be combined to form sentences in a language. **Semantics** the meaning of words and combinations of words in a language.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Uses the available material to increase his efficiency. 2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task. 3-Defines basic Modals and employ them in elementary level of communication and writing skills. 4- Develop and enhance students' language skills to communicate in English properly. 5- Interprets the texts written in elementary level of English.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	18	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Able to identify linking Ideas: Present and Past Irregular Plurals, Consonants, There was/were
Week 2	Identify countable and Uncountable Nouns, Imperatives Healthy Living and
Week 3	Able to identify can for ability Could and Couldn't Skills at work
Week 4	Able to identify can for requests Adjectives and Adverbs
Week 5	Able to identify describing People, Present Continuous and Adjectives
Week 6	Demonstrates knowledge about question for, 'information, prepositions: (at, in, on, to)
Week 7	Mid-term Exam
Week 8	Able to identify (Have to don't have to Housework, home, school & work obligations)
Week 9	**Mid-term Exam**
Week 10	Demonstrates knowledge about Offering and Inviting Why..? Would you like to...? Let's...? Free time activities
Week 11	Able to identify (Be going to + infinitive for plans)
Week 12	Able to identify (Be going to weak forms: Maybe/perhaps)
Week 13	Able to identify {Past Simple have to)
Week 14	Demonstrates knowledge about Transport, Prepositions of movement Address
Week 15	Demonstrates knowledge about (Writing Activities)
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Headway book for learning English	Yes
Recommended Texts	Skills in writing and Learning English	No
Websites	https://www.bbc.co.uk/learningenglish/	

Grading Scheme
مخطط الدرجات

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

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

نموذج وصف المادة الدراسية

حاسوب

Module Information
معلومات المادة الدراسية

Module Title	**Computer**	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐**Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATUU1111		
ECTS Credits	**3**		
SWL (hr/sem)	**75**		
Module Level	UGx	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader	Salim Mohsen Wadi	**e-mail**	coj.sal@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.

Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024	**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. Utilize the computer for fundamental tasks. 2. Identify and discuss the hardware components of the computer system. 3. Creating documents using word processor and creating presentations 4. Conducting research on the internet
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enable to describe the computer components. 2. Enable to Installthe softwaer program of a computer. 3. Connect to the internet and share resources in a networked environment. 4. Enable to work on microsof office. 5. Troubleshoot using system tools and diagnostic software.
Indicative Contents المحتويات الإرشادية	- Introduction to computer - Computer componenets - Operting system and graphical user interface GUI - Word Processing - Spread sheet - Presentation Software - Introduction to Internet and Web browsers - Communication and Emails - Computer troublshooting

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding

	their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
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	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

(المفردات تم تعميمها حسب كتاب الوزارة ذي العدد ت م 3/ 11009 بتاريخ 9/ 10/ 2024)

	Material Covered
Week 1	introduction to Computer: Concepts of Hardware and Software with their components; Concept of Computing, Data and Information; Applications of Information Electronics and Communication Technology (IECT); Connecting input/output devices, and peripherals to CPU.
Week 2&3	Computer Components: Computer Portions, Hardware Parts, I/O Units, Memory Types, Basic CPU Components, Computer Ports, Personal Computer, Personal Computer (Features and Types).

Week 4&5	Operating System and Graphical User Interface GUI: Operating System; Basics of Common Operating Systems; The User Interface, Using Mouse Techniques; Use of Common Icons, Status Bar, Using Menu and Menu-selection, Concept of Folders and Directories, Opening and closing of different Windows: Creating Short cuts.
Week 6&7	Word Processing: Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document.
Week 8&9	Spread Sheet: Basics of Spreadsheet; Manipulation of cells; Formulas and Functions; Editing of Spread Sheet, printing of Spread Sheet
Week 10&11	Presentation Software: Basics of presentation software; Creating Presentation; Preparation and Presentation of Slides: Slide Show; Taking printouts of presentation.
Week 12	**Mid term exam**
Week 13	Introduction to Internet and Web Browsers: Computer networks Basic; LAN, WAN; Concept of Internet and its Applications; connecting to internet; World Wide Web; Web Browsing software's, Search Engines; Understanding URL: Domain name; IP Address.
Week 14	Communications and Emails: Basics or electronic mail; Getting an email account; Sending and receiving emails; Accessing sent emails; Using Emails; Document collaboration.
Week 5	Computer Troubleshooting: Identifying and solving common hardware and software problems that computer users encounter. Basic troubleshooting techniques and tools for diagnosing and resolving issues.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	get started with use of computer
Week 2	Basic use of Windows operating system
Week 3	General view of Microsoft Office tools
Week 4	Getting Started with Microsoft Office Word
Week 5	Microsoft Office Word: Editing a Document and Formatting Text and Paragraphs
Week 6	Microsoft Office Word: Adding Tables and Inserting Graphic Objects
Week 7	Microsoft Office Word: Controlling Page Appearance and Proofing a Document
Week 8	Microsoft Office Excel: Getting Started with Microsoft Office Excel
Week 9	Microsoft Office Excel: Sorting, Selecting and Subtotaling data
Week 10	Microsoft Office Excel: Formulas and Functions
Week 11	Microsoft Office Excel: Worksheet Formatting and Presentation
Week 12	Microsoft Office PowerPoint: Getting Started with Microsoft Office PowerPoint
Week 13	Microsoft Office PowerPoint: Developing a PowerPoint Presentation, Adding Graphical
Week 14	Elements to Your Presentation and Modifying Objects in Your Presentation
Week 15	Microsoft Office PowerPoint: Adding Graphical Elements, tables and charts to Your

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Graham Brown, David Watson, “Cambridge IGCSE Information and Communication Technology”, 3rd Edition (2020) 2- Microsoft Office 2019 Step by Step. By Joan Lambert, Curtis Frye Part of the Step by Step series.	no
Recommended Texts	1- Absolute Beginner's Guide to Computer Basics Part of: Absolute Beginner's Guide (34 books) | by Michael Miller | Jan 1, 2009 2- Alan Evans, Kendall Martin, Mary Anne Poatsy, “Technology In Action Complete”, 16th Edition (2020).	No
Websites		

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

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

نموذج وصف المادة الدراسية

رياضيات 1

Module Information

معلومات المادة الدراسية					
Module Title	**Calculus I**			**Module Delivery**	
Module Type	**basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU11103**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Ahmed Mohammed Zeki		**e-mail**	Ahmed.alhilli@atu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills and understanding of functions and their differentiation. 2. To understand differentiation and its geometric meaning. 3. To understand differentiation applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the meaning of functions and their properties 2. Combining functions. 3. Understanding shifting and scaling of functions. 4. Definition of Trigonometric and exponent functions. 5. Basic understanding of rates of changes and tangent of curves. 6. Limit of functions and limits laws. 7. Continuity of functions. 8. Tangent and derivative of a point.

	9. The derivative as a function. 10. Differentiation rules. 11. The chain rule. 12. Implicit differentiation, the inverse function and logarithms 13. Inverse trigonometric functions 14. Application of derivatives
Indicative Contents المحتويات الإرشادية	Functions, types of functions, graph of the functions, domain and range of function Trigonometric function: graph of trigonometric function, range and domain of trigonometric functions, identities. Limits and Continuity: Properties, limits involving infinity, continuity. Transcendental functions: Inverse function, graph of inverse function, Logarithmic and exponential functions, inverse trigonometric functions, hyperbolic functions, inverse hyperbolic functions. Derivatives: Definition, rules of derivative, Implicit differentiation, Applications of derivatives: rate of change problems, derivative, Linearization, Mean value theorem, Initial value problem.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	The main strategies that will be adopted in delivering this module is to encourage students to engage in exercises, while at the same time honing and expanding their critical thinking skills. Teaching methods include interactive lectures, where basic mathematical principles are explained in detail. Regular formative assessments will be conducted to monitor students' understanding of the material, and immediate feedback will be provided to guide their learning process. Emphasis will be placed on linking mathematical concepts to real-world engineering applications to make the learning experience more relevant and engaging.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Home Work	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Understand the meaning of functions and their properties
Week 2	Combining functions.
Week 3	Understanding shifting and scaling of functions.
Week 4	Definition of Trigonometric and exponent functions.
Week 5	Basic understanding of rates of changes and tangent of curves.
Week 6	Limit of functions and limits laws.
Week 7	Continuity of functions.
Week 8	Tangent and derivative of a point.
Week 9	The derivative as a function.
Week 10	Differentiation rules.
Week 11	The chain rule.
Week 12	Implicit differentiation, the inverse function and logarithms
Week 13	Inverse trigonometric functions
Week 14	Application of derivatives
Week 15	Application of derivatives
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Thomas' Calculus 14th edition	Yes
Recommended Texts	Calculus 10th edition by Anton, Bivens, and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

Grading Scheme

مخطط الدرجات

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

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

نموذج وصف المادة الدراسية

دوائر التيار الكهربائي المستمر

Module Information

معلومات المادة الدراسية

Module Title	**DC Electrical Circuits**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU11104**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		

Module Level	UGx1	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader	Serab Jwyed Musa	**e-mail**	inj.srb@atu.edu.iq
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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	4. To develop problem solving skills and understanding of circuit theory and circuit analysis through the application of techniques. 5. To understand voltage, current and power from a given circuit. 6. This course deals with the basic concept of electrical circuits. 7. This is the basic subject for all electrical and electronic circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	15. Recognize how electricity works in electrical circuits. 16. Learn the various terms associated with electrical circuits. 17. Describe electrical power, charge, and current. 18. Define Ohm's law. 19. Learn the basics of circuits connections (series, parallel, and Y-Δ connections). 20. Identify the basic circuit elements and their applications. 21. Explain the basic rules of electric circuits analysis, such as Ohm's law, voltage and current division rules, and Kirchhoff's laws. 22. Explain circuits analysis methods, such as nodal and mesh analysis. 23. Explain circuits analysis theorems, such as Thevenin's and Norton's theorems, in addition to superposition principle. 24. Explain the principles of maximum power transfer and its relationship to circuits analysis theorems.
Indicative Contents المحتويات الإرشادية	Basic Concepts Current and voltage definitions, passive sign convention and circuit elements, combining resistive elements in series and parallel Basic Laws Series and parallel connections, Ohm's law, Kirchhoff's laws, Voltage and current division rules. Series and parallel circuit Circuit Analysis Methods Nodal analysis and Mesh analysis. Circuit Theorems Thevenin's and Norton's theorems, in addition to superposition principle. Three phase circuit

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Charge, current, voltage, resistance and conductance
Week 2	power and energy. Power sign convention.
Week 3	Basics of Network Elements, Definition of Nodes, Branches, and Loops, type of sources.
Week 4	Series and parallel circuits: series circuits, voltage divider rule, current divider rule.
Week 5	Star-delta transformations.
Week 6	Kirchhoff's Laws.
Week 7	**Mid-term Exam.**
Week 8	Circuit Analysis - Nodal method.

Week 9	Circuit Analysis – Mesh method.
Week 10	Linearity and Superposition.
Week 11	Source Transformations.
Week 12	Thevenin's Theorem.
Week 13	Norton's Theorem.
Week 14	Maximum power transfer theorem.
Week 15	Preparatory week before the final Exam.
Week 16	**Final Exam.**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Laboratory Equipment Training.
Week 2	Lab 2: Measuring voltage, current and resistance.
Week 3	Lab 3: Ohm's law.
Week 4	Lab 4: Series connections.
Week 5	Lab 5: parallel connections.
Week 6	Lab 6: Voltage divider rule.
Week 7	Lab 7: Voltage divider rule.
Week 8	Lab 8: Star-Delta Transformations
Week 9	Lab 9: Kirchhoff's laws.
Week 10	Midterm exam
Week 11	Lab 10: Thevenin's theorem.
Week 12	Lab 11: Norton's theorem.
Week 13	Lab 12: Superposition principle.
Week 14	Lab 13: Maximum power transfer.
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach Copyright Year: 2020, dissidents.	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

نموذج وصف المادة الدراسية

فيزياء واشباه الموصلات

Module Information

معلومات المادة الدراسية

Module Title	**Physics and Semiconductor**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**ATU11105**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		

Module Level	UGx1	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader	Thenaa Hassan Yousaf	**e-mail**	thanaa.yousif.chm@atu.edu.iq
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand atom models. 2. To Know the Semiconductor materials and their types. 3. To Know the P-N junction and biasing 4. To understand the V/I Characteristics of the diode. 5. To study the Equivalent circuit of the diode and analysis its circuit. 6. To study the diode types and their applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Learn about the structure of the atom. 2. Discuss the energy bands in an atom. 3. Discuss the types of semiconductor materials and how to manufacture them. 4. study generation and recombination of the carrier. 5. How to form the depletion layer. 6. Recognize the forward and reverse biased of the P-N junction. 7. Learn about Diode Equation. 8. Discussion of the Equivalent circuit of the diode. 9. Discuss the series and parallel diode configuration. 10. Study rectifier circuits, clipper and clamper circuits, and voltage doublers. 11. Study zener diode and application,
Indicative Contents المحتويات الإرشادية	- Model of the atom., Bohr's model, atom energy levels, Collisions of Electrons with Atoms, The Photon Nature of Light, energy bands, valance and conduction bands, Insulators, Semiconductors and Metals. [8 hrs] - Semiconductor types: Intrinsic and Extrinsic Semiconductors, n-type and P-type, majority and minority carriers. Drift and diffusion currents, electron-hole pair, carrier and life time, generation and recombination of carrier. [12 hrs] - P-N junction, forward and reveres biased P-N junction, Diode Equation, Forward and reverse V/I Characteristics of diode, diode resistance. [11 hrs] - Equivalent circuit of diode: Piecewise Equivalent Circuit, Simplified Equivalent Circuit, Ideal Equivalent Circuit, Load line analysis, Examples. Series and parallel diode configuration examples. Half wave rectifier, full wave rectifier, clipper and clamper circuits, voltage doublers. [18 hrs] - Types of diodes, zener diode, light emitting diode, [11 hrs]
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 showing

	the students how the construction members exposed to external loads. This can be done by films or videos or by the ready structural software.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	93/15 =6.2
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	.55/15=82
Total SWL (hr/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

Week	Material Covered Syllabus
Week 1&2	Atoms, electrons and shells, energy levels, valance electron, Ionization, Molecules and Solids - Combination of atoms - Bonding force in solids, material classifications (conductors, insulators, and semiconductors).
Week 3&4	Semiconductor materials: Ge, Si, and GaAs, Covalent bonding, electron and hole current, intrinsic and extrinsic semiconductors. p-type and n-type materials.
Week 5&6	PN-junction and barrier potential. semiconductor diode, characteristics of diode, Silicon diode versus germanium diode, ideal diode versus practical, current-voltage relationship, temperature effect.
Week 7-9	Diode resistance level, Diode equivalent circuits, Diode in DC circuits series and parallel diode configurations, load line analysis, transition and diffusion capacitance, reverse recovery time, diode switching circuit; OR and AND gates.
Week 10-12	Diode in AC circuits; diode rectifiers circuit; Half wave rectifier operation, transformer coupler, full wave rectifiers operation; Bridge and center-tap full wave, capacitor filter.

Week 13&14	Diode clipping circuit, diode clamping circuits. other types of diodes; light emitting diode and Zener diode.
Week 15	Zener diode operation and its applications
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Lab instruments
Week 2	Lab 2: Forward and reverse V/I Characteristics of diode.
Week 3	Lab 3: half wave rectifier.
Week 4	Lab 4: Full wave rectifier with center tap transformer.
Week 5	Lab 5: Full wave (bridge) rectifier.
Week 6	Lab 6: clipper and clamper circuits
Week 7	Lab 7: voltage doubler and voltage triple
Week 8	Lab 8: Zener diode characteristics in forward biasing and reverse biasing.
Week 9	Lab 9: Using a zener diode to stabilize the voltage with a constant and variable resistive load.
Week 10	Lab 10: light emitting diode.
Week 11	Lab 11: characteristics of photo diode.
Week 12	Lab 12: characteristics of varactor diode.
Week 13	Lab 13: characteristics of Schottky diode.
Week 14	Lab 14: characteristics of Lazer diode.
Week 15	Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. Electronic Devices And Circuit Theory by R. Boylestad.	Yes
Recommended Texts	1. Electronic devices electronic flow version by Thomas L. Floyd	Yes
Websites		

APPENDIX:

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

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

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

نموذج وصف المادة الدراسية

حقوق انسان وديمقراطية

Module Information
معلومات المادة الدراسية

Module Title	**Human Right and Democracy**		**Module Delivery**
Module Type	**S**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**ATU11**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	UGx1	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader	Hiader abd Al-Jaleel	**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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	1يتعلم الطالب اساسيات حقوق لانسان والديمقراطية ، و كيف يدافع عنها بالطرق القانونية وماهي ضماناتها الداخلية والدولية 2- .استحصال المعرفة في مجال الديمقراطية وأنواع أنظمتها واثرها على حقوق الانسان 3- . تنمية شخصية الطالب وتعزيز وعيهم في الأنظمة السياسية الديمقراطية وتفاصيلها وكيفية تطبيقها على ارض الواقع واهمية ان يكون فعال في المجتمع من خلال احترامه لحقوق الاخرين ومعرفه ان الحقوق والحريات تنتهي عند بداية حقوقهم وحرياتهم ويؤدي واجباته بدال من اكتساب الحقوق فقط 4- .تعزيز ثقافة السالم القائمة على العدل والمساواة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	- 1تمكين الطالب من معرفة اساسيات الدفاع عن حقوقه وحقوق الاخرين بعد معرفتها ومعرفة أهميتها له وللمجتمع بصورة عامة وأيضا معرفه كل شخص حدود حقوقه وحريته. - ٢ تمكين الطالب في المشاركة السياسية وذلك من خلال معرفته بأهمية مشاركته في الانتخابات وتأثير هذه المشاركة على سير الانتخابات وتشكيل السلطة فيما بعد– . ٣ معرفه الطالب ضمانات حقوقه وحرياته وماهي مصادرها. ٤ – معرفة الفرق بين الحقوق والحريات 5 –فهم الطالب للقانون الدولي لحقوق الانسان وايضا الدولية والية عملها
Indicative Contents المحتويات الإرشادية	الجزء الاول –تعريف حقوق الانسان الجزء الثاني معرف حقوق الانسان في الأديان السماوية

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1زيادة وعي الطالب بأهمية معرفه حقوقه وواجباته اتجاه المجتمع وعالقة حقوق الانسان بالنظام الديمقراطي 2-ثقافة عامة في مجموعة من المجالات ومنها المجال القانوني و السياسي والاجتماعي

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	15% (15)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	15% (15)	2 and 12	LO #3, #4 and #6, #7
	Projects	----	--	--	--
	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	**Freedom & Democracy** - An introduction to freedom and democracy in multiple societies and on different ages, its types and how changes in regime occurred **Relativity in freedom** - Freedom is not an absolute idea but it is variable with respect to time, place regime…etc.
Week 2	**General Freedom guaranties** - Freedom has political and legal guaranties. **General freedom divisions** - Natural freedoms, private freedoms, intellectual freedoms, collective freedoms and political freedoms
Week 3	**Individual Freedoms** - Opinion freedom, expression freedom, press freedom…etc. **Democracy & political systems** - Overview about democracy and its history
Week 4	**Democracy types** - Direct and indirect **Dictatorship and its specification** - Overview and specification
Week 5	**Concepts about democracy** - Traditional meaning and modern meaning. **Democracy in Greek Civilization VS. Current democracy**
Week 6	**Current crisis of democracy** - Economical, social, cultural and political difficulties **Civil & political rights**

	- Which includes life right, personal freedom, possessing, contracting family…etc.
Week 7	**Individual importance and its relation with nation and regime** **Importance and specifications of sovereignty**
Week 8	**Main portions of a country** - People, land, government and sovereignty **Human rights in human history** - Human rights in ancient ages like Mesopotamian, Greek, and Roman civilizations
Week 9	**Human rights in divine religions** - In Christian and Islamic - Overview, properties and types
Week 10	**International confession of human rights** **Territorial confession of human rights** - international and legal resources from international agreements
Week 11	**NGO and its role in the protection of human rights** **Women rights** - In Islamic time
Week 12	**Children Rights** - In old civilizations - In divine religions In international agreement on 1989
Week 13	**Elections and human rights** - Human rights is a concept of free elections
Week 14	**Human rights resources in Iraq** - Basics of human rights in Iraq from the Iraqi constitution, year 2005 **Civil Rights** - Equality, life freedom rights and house and personal privacy
Week 15	**Political & economical rights** - Election rights government critique **Social & cultural rights** - This includes the right of family creation, social and health care, and the right of clean environment
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?

Required Texts	حقوق الانسان والطفل والديمقراطية /تأليف ماهر صالح علاوي ورياض عزيز هادي وعلي عبد الرزاق محمد واخرون	No
Recommended Texts	عباس الدليمي / حقوق الانسان الفكر والممارسة	No
Websites		

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

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

Module Description Form
نموذج وصف المادة الدراسية

الرسم الهندسي

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Drawing**			**Module Delivery**	
Module Type	**Basic B**			☐**Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	ATU11107				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Noor Fadil		**e-mail**	noor.habib@atu.edu.iq	
Module Leader's Acad. Title	Assistant lecturer		**Module Leader's Qualification**	MSc.	

Module Tutor		Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name		Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date		01/10/2024	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To present a brief vision of Computer-Aided Design (auto CAD) and the tools of this term. 2. Highlighting the mathematical modeling principles of line, arc, spline, and other segments. Fundamental of electricity element : resistance, inductance, …,etc. 3. Covering the significant programs utilized in the modeling and comparing these programs. 4. Defining the AutoCAD and workbench program's tools and modeling outcomes. 5. Explaining global and local coordinate systems in modeling.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Control of AutoCAD principles as background programming of each segment, such as line or arc. 2. Controlling the main and sub-tools of the AutoCAD program as a professional designer. 3. Contributing to knowing the methodology of drawing accuracy and technology terms. .
Indicative Contents المحتويات الإرشادية	Part A Introduction to modeling system in AutoCAD: Drawing planes, Preparing sheet drawings, Line commands, circle commands, Arc commands, Rectangle commands, straight slot commands, Ellipse commands, Spline commands, and 3D sketch planes. Part (B) Fit conceptual: Transition, Clearance, and Interference. Part (C) Bearing, Cams, Gears, and Belts, bolts, Welding conceptual.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	The strategy of this subject is to study the principles of computer-aided design (auto CAD) by employing one of the popular programs. The tools of autocad program contribute to developing the users' skills in 2D and 3D drawing. Besides, this program utilizes the assembly and sheet representation for sketched parts with annotation technologies. Furthermore, this program boosts the modeling of belts, coupling, gears, and cams. Consequently, prepare the students to design advance modeling of electrical and electronic circuits.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	4 and 12	
	Assignments	2	10% (10)	3 to 12	
	Projects / Homework	5	10% (10)	6 and 11	
	Report	1	10% (10)	0	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	25% (25)	15	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	DDA AND ELECTRICITY Algorithm for line, Bresenham Algorithm for arc, HC-Spline.
Week 2	Bezier spline, Preparing sheet and plane for drawing by SOLIDWORK program.
Week 3	2D and electricity drawing tools.

Week 4	2D and electricity drawing tools, 2D modify tools.
Week 5	3D and electricity drawing tools.
Week 6	3D and electricity drawing tools.
Week 7	3D drawing tools, Mid-Test.
Week 8	3D Modify-Features tools.
Week 9	Surfaces tools.
Week 10	Surfaces tools, Modify-Surfaces tools.
Week 11	Modify-Surfaces tools, Assembly tools.
Week 12	Assembly tools, Drawing Sheet tools.
Week 13	Feet and clearance tools.
Week 14	Bearing, Cams, and Gears tools
Week 15	Belts, Bolts, and Welding tools
Week 16	**Final Exam.**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Radhakrishnan, P., Subramanyan, S. and Raju, V., 2008. CAD/CAM/CIM. New Age International. Bethune, James D. Engineering Design and Graphics with SolidWorks 2016. United States: Pearson, 2016.	no
Recommended Texts	.	
Websites	-	

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Arabic language**			**Module Delivery**	
Module Type	**Suplement**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATUU112**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UG		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1- تعريف الطلبة اهم المفاتيح الاساس في التعامل بلغة عربية فصيحة خالية من اي الأخطاء. 2- رفع القدرات التعبيرية للطالب، ومساعدتهم على استخدام العبارة المناسبة بشكل صحيح وواضح. 3- تدريب الطلبة على التنظيم المنطقي للأفكار باللغة العربية الفصحى. 4- جعل الطلبة قادرين على اكتساب خزين لغوي من الكلمات والتعابير الفصيحة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- تعلم اساليب اللغة العربية . 2- استخدام علامات الترقيم أثناء الكتابة. 3- تعلم كيفية تحليل النصوص الأدبية. 4- التدريب على القراءة الواضحة والالقاء.
Indicative Contents المحتويات الإرشادية	1- توضيح أهمية اللغة العربية وفوائدها للطلبة من غير اختصاص اللغة العربية. 2- تفسير بعض الايات القرنية 3- تحليل بعض القصائد العربية. 4- قواعد اللغة العربية وأهميتها. 5- الأسماء، أنواعها، الضمائر 6- النكرة والمعرفة. 7- اعراب بعض الايات القرنية، الابيات الشعرية. 8- علامات الترقيم واهميتها في اللغة العربية. 9- شرح موضوع العدد ، وماهي اقسامه.
Strategies	-المحاضرة والمشاركة. -المناقشة والحوار.

-العصف الذهني. -كتابة التقارير عن الموضوع. - السؤال والجواب	

اللغة العربية

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

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	18	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	/15 =1.218
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	/15=2.132
Total SWL (hr/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
	Homework	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
	Midterm Exam	2 hr	10% (10)	7	LO # 1-7

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered / Syllabus
1	اللغة: توضيح أهمية اللغة العربية وفوائدها بالنسبة للطالب الجامعي من غير تخصص اللغة العربية.
2	اللغة: تفسير وتحليل عدد من آيات القرآن الكريم.، وبيان اهم الأوجه والبلاغية والنحوية.
3	اللغة: تفسير وتحليل عدد من آيات القرآن الكريم.، وبيان اهم الأوجه والبلاغية والنحوية.
4	اللغة: تفسير وتحليل عدد من آيات القرآن الكريم.، وبيان اهم الأوجه والبلاغية والنحوية.
5	الأدب: تحليل عدد من ابيات الشاعر ابي الطيب المتنبي ، وبيان اهم الأوجه والبلاغية والنحوية في القصيدة
6	الادب: تحليل أحد قصائد الشعر الحر للشاعر العراقي بدر شاكر السياب.
7	الادب: تحليل أحد قصائد الشاعر إيليا أبو ماضي، وبيان اهم الأوجه والبلاغية والنحوية في القصيدة
8	القواعد: معرفة اقسام الكلام، الاسم والفعل والحرف.
9	القواعد: النكرة والمعرفة
10	القواعد: الضمائر
11	القواعد: أسماء الاشارة
12	الاملاء: علامات الترقيم واهميتها في اللغة العربية.
13	الاملاء: شرح موضوع العدد، ومعرفة تميز العدد وماهي اقسام العدد مع الأمثلة وحالات الاعراب
14	الاملاء: احكام كتابة التاء المربوطة والمفتوحة والالف الممدودة والمقصورة
15	الاملاء: أحكام كتابة الضاد والظاء.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	-1	
Recommended Texts	-1	
Websites		

APPENDIX:

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

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

5MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

الرياضيات 2

Module Information معلومات المادة الدراسية					
Module Title	**Calculus 2**			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU11209**				
ECTS Credits	5				
SWL (hr/sem)	**125**				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader	Ahmed Mohammed Zeki		**e-mail**	Ahmed.alhilli@atu.edu.iq	
Module Leader's Acad. Title	Assist. Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	

Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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	8. To develop problem solving skills and understanding of functions and their integration. 9. To understand integrations and antiderivatives. 10. This course deals with the basic concept of calculus. 11. To understand integral applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. The Definite Integral, the Fundamental Theorem of Calculus 2. Indefinite Integrals and the Substitution Method 3. Definite Integral Substitutions and the Area Between Curves 4. Volumes Using Cross-Sections, Volumes Using Cylindrical Shells 5. Arc Length and Areas of Surfaces of Revolution 6. The Logarithm Defined as an Integral 7. Using Basic Integration Formulas 8. Integration by Parts 9. Trigonometric Integrals 10. Trigonometric Substitutions 11. Integration of Rational Functions by Partial Fractions
Indicative Contents المحتويات الإرشادية	- Integration - Method of integration - Application of definite integrals - Hyperbolic Functions

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Homework	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	Indefinite Integrals and the Substitution Method, Integration of Trigonometric and Hyperbolic functions
Week 2	Integration methods, 1) Integration by parts
Week 3	Trigonometric Integrals, Integrating powers of Trigonometric functions
Week 4	Integration by Trigonometric substitutions
Week 5	Integration by partial fraction
Week 6	Integration of rational function of sinx and cosx
Week 7	Integration of rational functions contains $\sqrt[n]{x}$
Week 8	Definite Integral, the Fundamental Theorem of Calculus
Week 9	Applications of definite Integral: a) The area under the curve, b) Area between two curves
Week 10	Volumes; Volumes Using Cross-Sections, Volumes Using Cylindrical Shells
Week 11	Complex Numbers, Complex Arithmetic; Argand Diagrams and the Polar Form
Week 12	The Exponential Form of a Complex Number; De Moivre's Theorem
Week 13	Matrices; Introduction to Matrices; Matrix Multiplication
Week 14	Determinants; The Inverse of a Matrix
Week 15	Matrix solution of equations; Solution by Cramer's Rule; Solution by Inverse Matrix Method
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Thomas' Calculus 14th edition	Yes
Recommended Texts	Calculus 10th edition by Anton, Bivens, and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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

دوائر التيار الكهربائي المتناوب

Module Information معلومات المادة الدراسية					
Module Title	**AC Electrical Circuits**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU11210**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader	Serab Jwyed Musa		**e-mail**	inj.srb@atu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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. To develop problem solving skills and understanding of AC circuits theory and AC circuits analysis through the application of techniques. 13. To understand voltage, current and power from a given AC circuit. 14. This course deals with the basic concept of AC electrical circuits. 15. To understand Poly Phase Circuits. 16. To understand Resonance circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	25. Describe the principles of sinusoidal signals and phasors. 26. Explain how sinusoidal signals behave when interact with AC circuits elements. 27. Learn the various terms associated with AC electrical circuits. 28. Learn the behavior of capacitors and inductors when connected to AC sources. 29. Learn the basics of circuits connections (series, parallel, and Y-Δ connections). 30. Describe the operation of RC, RL, and RLC circuits. 31. Explain the basic rules of AC electric circuits analysis, such as Ohm's law, voltage and current division rules, and Kirchhoff's laws. 32. Explain circuits analysis methods, such as nodal and meth analysis methods. 33. Explain circuits analysis theorems, such as Thevenin's and Norton's theorems, in addition to superposition principle and maximum average power transfer. 34. Explain Poly Phase Circuits. 35. Explain Resonance circuits.
Indicative Contents المحتويات الإرشادية	Basic Concepts Sinusoidal signals and their properties, Phasors, phasor representations, and time domain signals vs phasor domain signals. AC Circuits Elements Resistors, capacitors, and inductors: voltage-current relationship, impedance and admittance, equivalent circuits of capacitors and inductors as a function of signal frequency. Basic Laws, Analysis Methods, and Theorems in AC Series and parallel connections, Ohm's law, Kirchhoff's laws, Voltage and current division rules. Nodal analysis and Mesh analysis. Thevenin's and Norton's theorems, in addition to superposition principle. AC power Analysis Active power, reactive power, apparent power, power triangle, power factor correction. instantaneous and average power, maximum average power transfer. Resonance: Series resonance, quality factor, selectivity, bandwidth, parallel resonance. -

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Sinusoidal signals and their properties.
Week 2	Phasors: phasor representation, derivatives and integrals of sinusoids in phasor domain,
Week 3	AC Circuits Elements: V-I relationship of resistors, capacitors, and inductors.
Week 4	Series and parallel circuits: series circuits, voltage divider rule, current divider rule.

Week 5	Kirchhoff's Laws.
Week 6	Circuit Analysis – Nodal and mesh methods.
Week 7	**Mid-term Exam.**
Week 8	Superposition principle, and source transformation.
Week 9	Thevenin's and Norton's Theorems.
Week 10	AC Power Analysis: Instantaneous and average power, maximum average transferred power,
Week 11	AC Power Analysis: Active power, reactive power, apparent power, power factor.
Week 12-13	Resonance: Series resonance, quality factor, selectivity, bandwidth, parallel resonance, derive resonance frequency for many circuits
Week 14-15	Basic intro to three phase systems, balance load, unbalance load, power in three phase circuits.
Week 16	**Final Exam.**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Series RL circuits.
Week 2	Lab 2: Series RC circuits.
Week 3	Lab 3: Parallel RL circuits.
Week 4	Lab 4: Parallel RC circuits.
Week 5	Lab 5: Series RLC circuits.
Week 6	Lab 6: Parallel RLC circuits.
Week 7	Lab 7: Superposition theorem
Week 8	Lab 8: Maximum average AC power transfer.
Week 9	Mid-term exam
Week 10	Measure AC Power
Week 11	Lab 11: Maximum average AC power transfer.
Week 12	Series Resonance
Week 13	Parallel Resonance
Week 14	Measure power in three phase circuits
Week 15	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**

Required Texts	- Introductory to circuit analysis by Boylestad.	Yes
Recommended Texts	Fundamentals of Electric Circuits by C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education Electric circuits, Pearson Education by Nilsson, James William Textbook of Electrical Technology-Volume I (Basic Electrical Engineering), by Theraja, B. L. A.	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

الرقمية

Module Information

معلومات المادة الدراسية

Module Title	**Digital Logic**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**ATU11211**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		
Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	NETC

Module Leader	Huda Hussien Abed		**e-mail**	eng.huda2020@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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	This course aims to enable the student to: 17. Explain the number systems. 18. Perform arithmetic operations on binary number systems. 19. Define the logic gates. 20. Write the logic expression of the logic circuits. 21. Produce the truth table for the logic expressions. 22. Simplify the Boolean expressions. 23. Understand the functions of combinational logic circuits. 24. Analyze and design various combinational logic circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	36. Represent any given number in different bases (such as bases 2, 8, and 16). 37. Implement the arithmetic operations on binary numbers. 38. Obtain the 1's complement and 2's complement of binary numbers. 39. Identify the logic gates by their logic symbol, write the logic expression, and produce the truth table for the logic gates. 40. Analyze a logic circuit to determine its logic expression and truth table. 41. Employ theorems of Boolean algebra to simplify logic expressions. 42. Determine the standard SOP expression and standard POS expression from the truth table. 43. Use a Karnaugh map to minimize POS & SOP expressions. 44. Convert nonstandard logic expressions to standard logic expressions. 45. Implement the logic functions using only NAND gates or only NOR gates. 46. Design of various combinational logic circuits such as adders, subtractors, comparators, and code converters.

Indicative Contents المحتويات الإرشادية	Part A - Number Systems Define number systems, convert a decimal number to any radix number, convert a binary number to an octal or hexadecimal number and vice versa, and convert an octal number to a hexadecimal number and vice versa. [1-3 weeks] Part B - Arithmetic operations & logic gates Perform arithmetic operations on binary numbers, convert a binary number to its 1's complement, and 2's complement, Identify the logic gates, write the logic expression, and produce the truth table. [1-2 weeks] Part C - Combinational logic circuit Analyze a combinational logic circuit, draw a logic diagram, theorems of Boolean algebra, DE Morgan's theorem, standard SOP & POS expressions, use a Karnaugh map to minimize POS & SOP expressions, convert nonstandard expressions to standard expressions, implement the logic expressions using only NAND gates or only NOR gates. [1-5 weeks] Part D - Design combinational logic circuits • Arithmetic logic circuits: half-adder and full-adder logic circuits, half-subtractor and full-subtractor logic circuits. [1-2 weeks] • Code converters logic circuits: binary to gray code converter circuit and vice versa, Binary-to-BCD Code circuit, BCD to Excess-3 code converter circuit and vice versa. [1-2 weeks] • Comparators logic circuits: 1-bit & 2-bit comparators logic circuits. [1 week]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Interactive lecturing style, with opportunities for questions. • Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. • Interactive simulation for the logic circuits. • Make tutorial questions for formative feedback. • Assessments related to students' answers are delivered with scientific comments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	4 and 10	L #2, #3 and #9, #8
	Assignments	2	10% (10)	7 and 15	L #6, #7 and #13, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	12	LO #5, #10 and #12
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 - Number Systems: binary, decimal, octal, and hexadecimal numbers.
Week 2	Convert a decimal number to any radix number.
Week 3	Convert a binary number to an octal or hexadecimal number and vice versa, and convert an octal number to a hexadecimal number and vice versa.
Week 4	Perform arithmetic operations on binary numbers, and convert a binary number to its 1's complement, and 2's complement.
Week 5	Identify the logic gates, write the logic expression, and produce the truth table.
Week 6	Analyze a combinational logic circuit, draw a logic diagram, and theorems of Boolean algebra.
Week 7	DE Morgan's theorem, standard SOP expression, and standard POS expression.
Week 8	Mid-term Exam + Construct a Karnaugh map for two, three, and four variables, use a Karnaugh map to minimize POS & SOP expressions.
Week 9	Convert nonstandard expressions to standard expressions, and Use the Karnaugh map to convert between POS and SOP.
Week 10	Use NAND gates to create other logic gates, Use NOR gates to create other logic gates, and implement the logic functions using only NAND gates or only NOR gates.
Week 11	Design half-adder & full-adder logic circuits, and use full-adders to implement a parallel binary adder.
Week 12	Design the half- subtractor & full-subtractor logic circuits, and use full-subtractors to implement a parallel binary subtractor.
Week 13	Explain the concept of code converters, and describe gray code, BCD, and excess-3 code.
Week 14	Design combinational logic circuits that convert from one coding method to another.
Week 15	Design 1-bit, and 2-bit comparators using logic gates, and use the 74HC85 comparator to compare the magnitudes of two 4-bit numbers.
Week 16	**Final Exam.**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Explain the function of a logic gates (AND, OR, NOT, AND, NOR, XOR , and XNOR) using the logical board.
Week 2	resistors. Lab 2: Implement the logic gates (AND, OR, & NOT) using diodes, transistors, and
Week 3	Lab 3: Verify the truth table of logic gates (AND, OR, NOT, NAND, NOR, XOR, &XNOR) by using integrated circuits IC (7408, 7432, 7404, 7400, 7402, & 7486).
Week 4	Lab 4: Boolean's algebraic
Week 5	Lab 5: DE Morgan's theorem.
Week 6	Lab 6: Implement logic gates (AND, OR, NOT, NAND, NOR, XOR & XNOR) using NAND gates only.
Week 7	Lab 7: Implement logic gates (AND, OR, NOT, NAND, NOR, XOR & XNOR) using NOR gates only.
Week 8	Lab 8: Design the half-adder circuit using logic gates.
Week 9	Lab 9: Design the full-adder circuit using logic gates.
Week 10	Lab 10: Design the half-subtractor circuit using logic gates.
Week 11	Lab 11: Design the full-subtractor circuit using logic gates.
Week 12	Lab 12: Design the full subtractor circuit using logic gates.
Week 13	Lab 13: Implement a binary to gray code converter circuit using logic gates.
Week 14	Lab 14: Implement the BCD to Excess-3 code converter circuit using logic gates.
Week 15	Lab 15: Design (1-bit) comparator circuit using logic gates.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1. G. K. Kharate, "Digital Electronics" Oxford university press, 7th edition, ISBN 13: 978-0-19-806183-0, 2013.	NO
	2. Thomas L. Floyd, "Digital Fundamentals" Pearson Education, 11th edition, ISBN 10: 1-292-07598-8, 2015.	Yes
	3. T. Ndjountche "Digital Electronics 1", John Wiley & Sons, 1st edition, ISBN 978-1-84821-984-7, 2016.	Yes
	4. N. S. Widmer, G. L. Moss, R. J. Tocci, "Digital Systems", Pearson Education Limited e, 12th edition, ISBN 978-0-134-22013-0, 2017.	Yes
	5. Shuqin Lou, Chunling Yang, "Digital Electronic Circuits" Science Press, 4th edition, ISBN 978-3-11-061466-4, 2019.	NO
Recommended Texts	1. A.P. Godse and D.A. Godse, "Digital Logic Circuits" Technical Publications Pune, 4th edition, ISBN: 9788184316506, 2009.	NO
	2. R. S. Sedha, "A TEXTBOOK OF DIGITAL ELECTRONICS" S. Chand & Company ltd, ISBN: 81-219-2378-6, 2010.	Yes
	3. D. P. leach and a. p. malvino, "digital principles and applications", tata mcgraw hill education,7th edition, ISBN:978-0-07-014170-4, 2011.	Yes
	4. D. P. Kothari, and J. S. Dhillon "digital circuits and design" Pearson education, ISBN 978-93-325-4353-9, 2015.	No

	5.S. Salivahanan and S. Arivazhagan, “DIGITAL CIRCUITS AND DESIGN” Oxford : 978-0199488681, 2018.university press, 5th edition, ISBN-13	NO
Websites	https://www.allaboutcircuits.com/textbook/digital/	

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 DESCRIPTOR FORM
نموذج وصف المادة الدراسية

الدوائر الالكترونية

Module Information معلومات المادة الدراسية					
Module Title	**Electronic Circuits**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ATU11212**				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader	Thenaa Hassan Yousaf		**e-mail**	thanaa.yousif.chm@atu.edu.iq	

Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The student learns about the basic construction and operation of a bipolar transistor. And be able to apply appropriate biasing to secure operation in the active area. 1. Identify the characteristics of a BJT (NPN or PNP) and their response. 2. Student will be able to determine DC and AC load line. of important BJT configurations. 3. Understand the BJT transistor configuration. 4. The student will also be familiar with the saturation and cut-off conditions of the BJT. 5. Define the application of BJT transistor. 6. Identify FET, JFETs and MOSFET transistors, construction and characteristics 7. Learns about the basic construction and operation of a multistage amplifiers.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enable to know the concepts of BJT and FET transistors, know about the BJT and FET transistors configurations. 2. Enabling student to design of BJT circuits. 3. Understand the basic operation of transistor and applications 4. Enabling student to test the transistor 5. Enabling student to know the Design of multistage amplifiers.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Introduction to aviation electronics and its role in aircraft systems.

	1. Basic BJT principles, operation and configurations. 2. Basic FET principles, operation and configurations. 3. Basic MOSFET principles, operation and configurations. 4. Multistage amplifiers
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 showing the students how the construction members exposed to external loads .This can be done by films or videos or by the ready structural software.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	93/15 =6.2
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	.55/15=82
Total SWL (hr/sem) الحمل الدراسي الكلي للطالب خلال الفصل	175		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week	**Syllabus**
Week 1&2	Bipolar junction transistor, BJT operation, transistor configurations; common base configuration common emitter configuration, and common collector configuration, DC load line, Limits of operation.
Week 3	Analysis of Fixed bias configuration, voltage divider bias configuration.
Week 4	Collector feedback configuration; saturation level and load line analysis, emitter flower configuration, Design operation.
Week 5	Transistor switching networks, Multiple BJT networks, bias stabilization.
Week 6&7	BJT AC analysis, amplification in AC domain, BJT modeling, the "r e" transistor model, determine the current and voltage gain, two-port system approach, The Hybrid Equivalent Model, cascade system, frequency response of BJT amplifiers.
Week 8-10	Field effect transistors, FET types, FET fixed bias configuration, self-bias configuration, voltage divider configuration, common-gate configuration. FET amplifiers. junction FETs, construction and characteristics of JFETs, transfer characteristics, specification sheets (JFETs).
Week 11&12	MOSFETs, depletion type MOSFET, enhancement type MOSFET, MOSFET Handling. E-MOSFET drain feedback configuration, E-MOSFET voltage divider configuration, Designing FET amplifier networks
Week 13-15	BJT and JFET frequency response, Logarithms, decibel, general frequency consideration, normalization process, low frequency analysis, low frequency response-BJT amplifier with RL, impact Rs on the BJT low frequency response, low-frequency response FET amplifier, Miller effect capacitance, high-frequency response -BJT amplifier, high frequency response- FET amplifier, multistage frequency effect.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to the lab tools which uses in the experiments
Week 2	Lab 2: BJT Transistor Characteristics.
Week 3	Lab 3: Transistor CE Characteristics.
Week 4	Lab 4: Transistor CB Characteristics.
Week 5	Lab 5: Transistor CC Characteristics.
Week 6	Lab 6: Transistor as switch
Week 7	Lab 7: Frequency response of common emitter amplifier.
Week 8	Lab 8: Frequency response of common base amplifier.
Week 9	Mid Term exam.
Week 10	Lab 10: FET Transistor Characteristics.
Week 11	Lab 11: FET common Source Characteristics.
Week 12	Lab 12: FET common drain Characteristics.
Week 13	Lab 13: MOSFET Transistor Characteristics.
Week 14	Lab 14: Multistage amplifiers.
Week 15	Lab 15: Multistage amplifiers.
Week 16	Final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Electronic devices electronic flow version by Thomas L. Floyd	yes
Recommended Texts	Electronic Devices And Circuit Theory by R. Boylston.	yes
Websites		

APPENDIX:

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

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

MODULE DESCRIPTOR FORM
نموذج وصف المادة الدراسية

الورش الهندسية

Module Information معلومات المادة الدراسية

Module Title	**Engineering Workshops**		**Module Delivery**	
Module Type	**Basic**		☐ **Theory** ☐ **Lecture** ☐ **Lab** ☐**Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**ATU11213**			
ECTS Credits	**3**			
SWL (hr/sem)	**75**			
Module Level	UGx1	**Semester of Delivery**	2	
Administering Department		**College**	NETC	
Module Leader	Liath Wajeh	**e-mail**		
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)	**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. Develop practical skills in electronics workshop operations, focusing on safety measures and proficiency in using measuring devices and tools. 2. Acquire knowledge and techniques related to welding, soldering, and handling electronic components on printed boards. 3. Gain familiarity with various electronic components, circuits, and their behaviors through hands-on manufacturing and experimentation. 4. Understand the principles of parallel and series circuits involving resistors and capacitors, and apply them in practical scenarios. 5. Enhance the ability to read and interpret electronic boards, and design and assemble electronic circuits on printed boards.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Demonstrate a thorough understanding of the fundamental concepts and principles of electronics, including measuring devices, soldering techniques, and electronic components. 2. Apply knowledge and skills in conducting welding and soldering operations with precision and adherence to safety guidelines in an electronics workshop. 3. Construct and analyze various electronic circuits, including resistive,

	capacitive, and semiconductor circuits, using appropriate tools and materials. 4. Evaluate and troubleshoot electronic circuits, identify faults, and apply effective problem-solving techniques to rectify issues. 5. Develop proficiency in reading and interpreting electronic boards, designing and assembling circuits, and effectively communicating ideas and findings related to electronics.
Indicative Contents المحتويات الإرشادية	1. Electronic Workshop: Acquire practical skills in electronics, including the use of measuring devices, soldering techniques, and working with electronic components. 2. Mechanical Workshop: Develop hands-on knowledge and skills in mechanical engineering, including working with different tools, understanding mechanical systems, and performing various mechanical operations.
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 showing the students how the construction members exposed to external loads. This can be done by films or videos or by the ready structural software.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (hr/sem) (SSWL) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2/15 =48
Unstructured SWL (hr/sem)(USSWL) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	/15=1.827
Total SWL (hr/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	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي المختبري

Week	Material Covered Syllabus
1-7	• Occupational Safety, Foundry Workshop, Files type Workshop, Carpentry Workshop, Turnery workshop, Welding types Workshop
8	• Learn how to use different measuring devices in the workshop, Learn how to use caustic, types of caustic, welding by using caustic
9	• Types of welding, Auxiliary materials for welding, wires welding between them and with other components. • Sucker solder and Solder removal, Training to remove some of the electronic components of the printed board
10	• Learn different types of printing board through printing method, drilling operation, Install the various components.
11	• Different types of electronics components through manufacturing for example the resistance and its power, measure the value of resistance in different methods, rheostat, Parallel resistance circuit - series resistance circuit - parallel and series resistance circuits - and check it.
12-13	• Types of capacitance • 14-15 Parallel capacitance circuit - series capacitance circuit - parallel and series capacitance, circuit - check it on the board, Switch types, Fuses types, Inductor types, Transformer types
14-15	• Learn how to read electronic board, Students learn to design electronic board on the printed board, install the component on the board, and welding the components on the board.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Electronics Workshop Companion by Stan Gibilisco	no
Recommended Texts	Electronic Principles Eighth Edition by Albert Malvino | David Bates. Make: Electronics Second Edition by Charles Platt.	
Websites		

APPENDIX:

GRADING SCHEME

مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition

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

Note:

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

تصميم دوائر الالكترونية

Module Information
معلومات المادة الدراسية

Module Title	Electronic Circuits Design		**Module Delivery**
Module Type	C		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	ATU11301		
ECTS Credits	6		
SWL (hr/sem)	150		

Module Level	UGIII	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader	Ahmed Adnan Wahhab	**e-mail**	ahmedadnan@atu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	M.Sc.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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	25. The student learns about the basic construction and operation of a power electronic. 26. Identify and be able to explain the characteristics all types of rectifier circuits. 27. Being able to identify Chopper circuits. 28. Able to design inverter circuits 29. Able to design Voltage controller
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Knowing the concepts of power electronic. 2. Knowing about the Thyristor principle and application 3. Enabling to design inverter and chopper circuits
Indicative Contents المحتويات الإرشادية	- Power electronics - Thyristor principle and application - Controlled rectifier - Inverter - Choppers

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Power electronics systems: Power semiconductor diode : basic structure of power diode, I-V characteristics of power diode.
Week 2	power diode types (general purpose, fast switching and sckootky diodes), effect of forward and reverse recovery time of diode, diodes and rectifier circuit (half wave and full wave).
Week 3	Power transistor: bipolar junction transistor
Week 4-5	Power MOSFET, insulated Gate BJT, IGBJT structure
Week 6	Thyristor principle and application: basic structure of thyristor, I-V characteristics, two transistor model of thyristor
Week 7	turn-ON and turn-OFF characteristics, thyristor gate characteristics
Week 8	thyristor protection circuit, di/dt protection circuit, dv/dt protection circuit
Week 9	thyristor commutation circuit, series and parallel connection of thyristor, thyristor types
Week 10	controlled rectifier: single phase half wave rectifier (R, RL) load, freewheeling diode single phase full wave rectifier (RL)
Week 11&12	inverter : classification of inverter , single phase half wave inverter, single phase full bridge wave inverter
Week 13	Voltage controller: introduction to voltage controller, principle of ON-OFF control
Week 14&15	Choppers: introduction to chopper, basic classification of chopper, basic operation.

Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introduction to the lab tools which uses in the experiments.
Week 2 -3	**Thyristor** operation, **Thyristor** protection
Week 4&6	**Thyristor** applications
Week 7	Midterm exam
Week 8-9	controlled rectifier
Week 10 -12	Single phase inverter
Week 13 & 14	Chopper
Week 15	Final exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Power electronics devices, circuits, and applications by Muhammad H. Rashid	No
Recommended Texts	electronic-devices-9th-edition-by-floyd	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

إشارات وانظمة

Module Information معلومات المادة الدراسية					
Module Title	**Signal and System**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11302				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Ahmad H. Hadi		**e-mail**	Coj.Ahmadhadi@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	1/10/2024		**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. Define the basics of signals in real-life. 2. Determine the circuit response to a periodic signal using the Fourier Series. Model linear time-invariant systems using convolution. 3. Describe how composite signals are used to determine the response of linear systems) 4. To understand the power and energy of signals. 5. Demonstrate what happens in the frequency domain when a continuous signal is sampled. 6. Design an anti-alias filter for a sampled data system. 7. Utilize the z-Transform to describe a discrete-time signal. 8. Understanding the representation signals using (Time/Frequency) domains
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	47. Understand the main signal and recognize different types of signals and systems. 48. Have the ability to Understand Signals operations. 49. Understanding the convolution and correlation operations. 50. Have the ability to design Filters. 51. Have the ability to representation of the signals in time/frequency- domains.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Signals and Systems. (6 hrs). 2. Fourier Series and Fourier Transform (6 hrs). 2. Filters (3 hrs). 3. Convolution and Correlation (6 hrs). 4. Noise (9 hrs). 6. Sampling (9 hrs). 7. Transmission lines (6 hrs).

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	78/15= 5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	72/15= 4.8
Total SWL (h/sem)	**150**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1-5	Signals and Systems, spectrum, and filters; Singularity functions; periodic signals and Fourier series; nonperiodic signals and Fourier transform. convolution and impulses system response and filters; correlation and spectral density; Parseval's theorem for energy signals
Week 6-8	Noise: Band-limited white noise; thermal noise; noise figure.
Week 9	Mid-term Exam
Week 10-12	Sampling: sampling theory and practice, aliasing.
Week 13-15	Transmission lines: characteristic impedance, reflection coefficient and standing waves
Week 16	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Introducing laboratory equipment and their operation.
Week 2-3	Low pass filter and high pass filter (passive)
Week 4&5	Signals operations using RLC circuits and responses
Week 6&7	band pass filter and band reject filter
Week 8-9	Filter design: First order and second order filter design
Week 10	Midterm exam

Week 11-12	Oscillator's operation, Hartley oscillator, voltage control oscillator
Week 13	Signal analysis using oscilloscope
Week 14	sampling of signals circuits
Week 15	Aliasing proofing
Week 16	Final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Introduction to Communication Systems" By F. G. Strelmer	No
Recommended Texts	Sanjay Sharma: "Communication Systems (Analog and Digital) T. R. Ganesh Babu, and G. Srinivasan: " Communication Theory and systems", 2006	No
Websites		

Grading Scheme

مخطط الدرجات

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

مجالات كهرومغناطيسية ثابتة

Module Information معلومات المادة الدراسية					
Module Title	**Electromagnetic Static Fields**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11303				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Ghufran Mahdi Hatem		**e-mail**	Coj.ghf@atu.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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	30. To provide a comprehensive understanding of the fundamental concepts and principles of electromagnetic fields. 31. To develop the ability to analyze and solve problems related to electromagnetic fields.

	32. To enhance critical thinking skills in applying electromagnetic field theory to practical engineering applications. 33. To foster an appreciation for the importance of electromagnetic fields in various disciplines of engineering and science.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explain the basic concepts and principles of electromagnetic fields. 2. Analyze and solve problems related to static and dynamic electric and magnetic fields. 3. Apply electromagnetic field theory to practical engineering applications. 4. Demonstrate an understanding of the interactions between electric and magnetic fields. 5. Evaluate and analyze electromagnetic wave propagation and transmission. 6. Apply mathematical techniques, including vector calculus, in the analysis of electromagnetic fields.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Electromagnetic Fields a. Review of vector calculus and coordinate systems and transformation Between Coordinates and Dell operator b. Electric charge and Coulomb's law c. Electric field intensity and electric flux d. Gauss's law and its applications 2. Electric Fields in Materials a. Electric potential and voltage b. Conductors, insulators, and dielectrics c. Capacitance and capacitance calculations d. Poisson's and Laplace's equations

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**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 #1…….#16
	Assignments	2	15% (15)	2 and 12	LO #3, #4 and #6, #7
	Homework	0	0%	-------	----------
	Report	2	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Electromagnetic Fields
Week 2	Vector definition- Scalars And Vectors and Vector Algebra
Week 3	The Cartesian Coordinate System - Vector Component And Unit Vectors - The Vector Field - Dot Product - Cross Product
Week 4	Cylindrical Coordinate - Spherical Coordinate
Week 5	Transformation Between Coordinates
Week 6	Del Operator - Laplacian Operator - Gradient - Divergence and Curl
Week 7	Coulomb law -Electric force
Week 8	Coulomb law - Electric field intensity - Field due to continuous volume charge - Field of line charge - Field of sheet charge
Week 9	Mid-term Exam
Week 10	Electric Flux Density
Week 11	Gauss Law - Application of Gauss Law - Maxwell First Equation.
Week 12	Energy and Potentials in A Moving Point Charge in An Electric Field
Week 13	Dielectric and Capacitance - Current and Current Density - Continuity of Current - Metallic Conductor
Week 14	Boundary Conditions - Image Theory -Semiconductor - Dielectric Materials – Capacitance
Week 15	Poisson's and Laplace's equations
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	W.H. Hayt, and J.A. Buck, "Engineering Electromagnetics", McGraw-Hill, 2007.	Yes
Recommended Texts	1) David K. Cheng, "Fundamentals of Engineering Electromagnetics", Prentice Hall, 1993. 2) Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th ed. Oxford, 2006.	Yes
Websites	https://empossible.net/academics/emp3302/	

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

نمذجة الأنظمة رياضيا

Module Information

معلومات المادة الدراسية

Module Title	**Mathematical Modeling Systems**	**Module Delivery**
Module Type	**Basic**	☒ **Theory**
Module Code	**ATU11304**	☐ **Lecture**
ECTS Credits	**5**	☐ **Lab**
SWL (hr/sem)	**125**	☒ **Tutorial** ☐ **Practical** ☐ **Seminar**

Module Level	UGx1	**Semester of Delivery**	1

Administering Department		**College**	NETC
Module Leader	Asaad. S. Daghal	**e-mail**	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1- To understand functions of multiple variables, limits, continuity, and partial derivatives. 2- To apply the chain rule, directional derivatives, and gradients. 3- To determine tangent planes, normal vectors, and extrema of functions in two variables. 4- To work with polar, cylindrical, and spherical coordinates. 5- To understand vectors in 3D space, including dot and cross products. 6- To evaluate double and triple integrals over various regions. 7- To apply convergence tests to infinite series. 8- To approximate functions with Maclaurin and Taylor polynomials. 9- To explore power series and their applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Understanding functions of multiple variables 2- Computing partial derivatives 3- Applying the chain rule in multivariable calculus 4- Calculating directional derivatives and gradients of functions 5- Determining tangent planes and normal vectors to surfaces 6- Finding maxima and minima of functions of two variables 7- Working with polar coordinates and graphing polar equations 8- Calculating areas and lengths in polar coordinates 9- Understanding conic sections and their representation in polar coordinates 10- Working in three-dimensional space 11- Understanding vectors, dot product, cross product, and their applications 12- Describing lines and planes using parametric equations 13- Understanding quadric surfaces and working with cylindrical and spherical coordinates 14- Evaluating double integrals over various regions 15- Calculating surface area and working with parametric surfaces 16- Computing triple integrals in different coordinate systems 17- Applying change of variables and understanding Jacobians in multiple integrals 18- Understanding sequences and series

	19- Applying convergence tests and analyzing convergence properties 20- Approximating functions using Maclaurin and Taylor polynomials 21- Understanding power series and their convergence properties 22- Modeling with the Taylor series for various applications
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **1- Multivariable Calculus**: (25 h) • Functions of Two or More Variables • Limits and Continuity • Partial Derivatives • Directional Derivatives and Gradients • Tangent Planes and Normal Vectors **2- Optimization and Extrema**: (9 h) • Maxima and Minima of Functions of Two Variables • Lagrange Multipliers **3- Coordinate Systems and Vectors**: (25 h) • Polar Coordinates • Cylindrical and Spherical Coordinates • Matrices and Determinants • Vectors in Three-Dimensional Space • Dot Product and Cross Product **4- Multiple Integrals**: (25 h) • Double Integrals • Triple Integrals • Change of Variables in Multiple Integrals • Surface Area and Volume Calculations **5- Infinite Series and Sequences**: (25 h) • Convergence and Divergence • Taylor and Maclaurin Series • Power Series • Applications of Taylor Series

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Use the following Learning, Teaching, and Assessment strategies Learning Strategies: • Encourage students to actively engage with the material through problem-solving, discussions, and group activities. • Use visual aids like graphs, diagrams, and interactive simulations to help students grasp complex concepts in multivariable calculus and vector calculus. • Connect calculus concepts to real-world scenarios to demonstrate their practical relevance and enhance understanding. • Conduct engaging lectures that involve student participation, discussions, and demonstrations to keep students actively involved. • Incorporate hands-on activities, such as working with software tools for graphing or numerical calculations, to reinforce learning. • Assign challenging problems that require critical thinking and problem-solving skills, promoting a deeper understanding of the material. • Use formative assessments like quizzes, homework assignments, and in-class exercises to provide feedback and monitor student progress.

	• Present case studies or application problems that require students to apply calculus concepts to analyze and solve real-world problems. • Incorporate peer evaluation in group activities or projects to promote collaboration and peer learning. By incorporating these strategies into the learning and teaching process, students can develop a solid understanding of advanced calculus topics and enhance their problem-solving skills in multivariable calculus, vector calculus, and series expansions.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.1
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Homework	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Functions of Two or More Variables, Limits and Continuity, Partial Derivatives
Week 2	The Chain Rule, Directional Derivatives and Gradients.
Week 3	Tangent Planes and Normal Vectors, Maxima and Minima of Functions of Two Variables, Lagrange Multipliers.
Week 4	Polar Coordinates, Graphing Polar Coordinate Equations, Areas and Lengths in Polar Coordinates
Week 5	Conic Sections, Conics in Polar Coordinates
Week 6	THREE-DIMENSIONAL SPACE; VECTORS: Rectangular Coordinates in 3-Space

Week 7	Spheres; Cylindrical Surfaces, Vectors, The Dot Product, The Cross Product
Week 8	Parametric Equations of Lines, Planes in 3-Space, Quadric Surfaces, Cylindrical and Spherical Coordinates
Week 9	MULTIPLE INTEGRALS: Double Integrals, Double Integrals over Nonrectangular Regions,
Week 10	Double Integrals in Polar Coordinates, Surface Area; Parametric Surfaces
Week 11	Triple Integrals, Triple Integrals in Cylindrical and Spherical Coordinates, Change of Variables in Multiple Integrals; Jacobians
Week 12	INFINITE SERIES: Sequences, Monotone Sequences, Infinite Series, Convergence Tests
Week 13	The Comparison, Ratio, and Root Tests, Alternating Series; Absolute and Conditional Convergence
Week 14	Maclaurin and Taylor Polynomials, Maclaurin and Taylor Series; Power Series
Week 15	Convergence of Taylor Series, Differentiating and Integrating Power Series; Modeling with Taylor Series
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Thomas' Calculus 14th edition	Yes
Recommended Texts	Calculus 10th edition by Anton , Bivens , and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

Grading Scheme

مخطط الدرجات

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

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

نموذج وصف المادة الدراسية

تصميم دوائر رقمية

Module Information معلومات المادة الدراسية					
Module Title	**Digital Circuits Design**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11305				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Huda Hussein Abed		**e-mail**	eng.huda2020@atu.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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	34. Explain the concepts of sequential logic circuits. 35. Describe the difference between NAND and NOR latch. 36. Explain the operation of S-R, D, J-K, and T flip-flops. 37. Create the excitation table and characteristic equation for the flip-flops. 38. Design asynchronous counters and draw the timing diagram for them. 39. Define the modulus number for the counter. 40. Design synchronous counters and draw the timing diagram for them. 41. Explain the concepts of the shift register. 42. Implement the logic circuits of the multiplexer, demultiplexer, encoder, and decoder using logic gates.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	52. Describe the difference between combinational logic circuits and sequential logic circuits. 53. Explain the operation of the S-R latch. 54. Identify the difference between a positive and a negative edge-triggered flip-flop. 55. Describe the outputs of a given flip-flop. 56. Explain the difference between asynchronous and synchronous counters. 57. Draw the timing diagram for the counters. 58. Design various types of counters according to the given requirement. 59. Write the modulus of the given counter and the entire count sequence. 60. Define the concept for cascading counters. 61. Explain the operation of a multiplexer and a demultiplexer. 62. Explain the operation of an encoder and a decoder.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – Concept of sequential logic circuits and flip-flops</u> Define the sequential logic circuits, explain the operation of the S-R latch, determine the Q waveform for the NOR and NAND latch, define the flip-flop, explain the S-R, D, J-K, and T flip-flops, determine the Q output waveforms of the S-R, D, J-K, and T flip-flops, create the excitation table and characteristic equation for the flip- flops. [1-4 w] <u>Part B – Counters</u> Explain the operation of an asynchronous counter, design an asynchronous counter using J-K, D, and T flip-flops, draw the timing diagram for an asynchronous counter., define the modulus number for the counter, explain propagation delays in ripple counters, find the count sequence for the asynchronous counter with a truncated sequence, design of synchronous counters using J-K, T, and D flip-flops, analysis of synchronous counter to find the complete count sequence, create the timing diagram for the synchronous counter, describe the concept of cascading the counters, and explain the operation of a Johnson and Ring counters. [1-7 weeks] <u>Part C – Shift Registers</u> Describe the operation of four types of shift registers (SISO, SIPO, PISO, and PIPO), explain how data bits are entered into a shift register, and explain how data bits are taken out of a shift register. [1 week] <u>Part D – Analysis and Design combinational logic circuits</u> Implement 2:1, 4:1, and 8:1 multiplexers using logic gates, design higher order multiplexers using lower order multiplexers, implement logic functions using multiplexers, implement 1:2, 1:4, and 1:8 demultiplexers using logic gates, design higher order demultiplexers using lower order demultiplexers, describe the decimal-to-BCD encoder and the octal-to-binary encoder, explain the purpose of the priority feature in the binary encoders, describe the BCD-to-decimal decoder and the binary-to-octal decoder, and implement 2-to-4-line decoder with active low enable input using logic gates. [1-3 weeks]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Interactive lecturing style, with opportunities for questions. • Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. • Interactive simulation for the logic circuits. • Make tutorial questions for formative feedback. • Assessments related to students' answers are delivered with scientific comments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4.8
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 11	L #2, #3 and #8, #9
	Assignments	2	10% (10)	7 and 14	L #6, #7 and #13, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #10 and #12
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 - Define the sequential logic circuits, and explain the operation of the S-R latch.
Week 2	Define the flip-flop, explain the operation of the S-R & D flip-flops, and determine the Q output waveforms of the S-R & D flip-flops.
Week 3	Explain the operation of J-K & T flip-flops, determine the Q output waveforms of the J-K & T flip-flops, and distinguish between synchronous and asynchronous inputs of the flip-flop.
Week 4	Create the excitation table of flip-flops, and derive the characteristic equation of the flip-flops.
Week 5	Design an asynchronous up binary counter using J-K flip-flops, design an asynchronous down binary counter using J-K flip-flops, and draw the timing diagram for an asynchronous counter.
Week 6	Describe the operation of an asynchronous up/down counter, define the modulus number for the counter, design a mod-10 asynchronous counter, and explain propagation delays in ripple counters.
Week 7	Design an asynchronous counter using D & T flip-flops, find the count sequence for the asynchronous counter with a truncated sequence, and explain the concept of frequency division.
Week 8	Mid-term Exam + Design of synchronous counters using J-K, T, and D flip-flops.
Week 9	Analysis of the synchronous counter to find the complete count sequence, create the timing diagram for the synchronous counter, and design a synchronous Up/Down counter.
Week 10	Design a synchronous decade counter, design a synchronous counter with the irregular count sequences, and describe the concept of cascading the counters.
Week 11	Explain the operation of a Johnson counter, draw the timing diagram for a Johnson counter, explain the operation of a ring counter, and draw the timing diagram for a Ring counter.
Week 12	Describe the operation of four types of shift registers (SISO, SIPO, PISO, and PIPO), explain how data bits are entered into a shift register, and explain how data bits are taken out of a shift register.
Week 13	Explain the basic operation of a multiplexer, implement 2:1, 4:1, and 8:1 multiplexers using logic gates, and design higher order multiplexers using lower order multiplexers.
Week 14	Implement logic functions using multiplexers, explain the basic operation of a demultiplexer, implement 1:2, 1:4, and 1:8 demultiplexers using logic gates, and design higher order demultiplexers using lower order demultiplexers.
Week 15	Describe the decimal-to-BCD encoder and the octal-to-binary encoder, explain the purpose of the priority feature in the binary encoders, describe the BCD-to-decimal decoder and the binary-to-octal decoder, and implement a 2-to-4-line decoder with active low enable input using logic gates.

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Implement the S-R latch using NOR gates & NAND gates.
Week 2	Lab 2: Construct S-R, and D flip-flops using logic gates.

Week 3	Lab 3: Construct J-K, and T flip-flops using logic gates.
Week 4	Lab 4: illustrate the effect of asynchronous inputs on the output of the J-K & D flip-flops
Week 5	Lab 5: Design an asynchronous up binary counter using J-K flip-flops.
Week 6	Lab 6: Design an asynchronous down binary counter using J-K flip-flops.
Week 7	Lab 7: Design a 4-bit synchronous counter using J-K flip-flops.
Week 8	Lab 8: Design a synchronous decade counter using J-K flip-flops.
Week 9	Lab 9: Design a Mod-8 Johnson counter using J-K flip-flops.
Week 10	Lab 10: Design a Mod-4 Ring counter using J-K flip-flops.
Week 11	Lab 11: Implement SISO shift register using J-K flip-flops.
Week 12	: Implement a 4:1 multiplexer using logic gates.2Lab 1
Week 13	: Implement a 1:4 demultiplexer using logic gates.3Lab 1
Week 14	: Design a 4 to 2 encoder using logic gates.4Lab 1
Week 15	Lab 15: Design a 2-to-4-line decoder using logic gates.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1. G. K. Kharate, "Digital Electronics" Oxford university press, 7th edition, ISBN 13: 978-0-19-806183-0, 2013. 2. Thomas L. Floyd, "Digital Fundamentals" Pearson Education, 11th edition, ISBN 10: 1-292-07598-8, 2015. 3. T. Ndjountche "Digital Electronics 1", John Wiley & Sons, 1st edition, ISBN 978-1-84821-984-7, 2016. 4. N. S. Widmer, G. L. Moss, R. J. Tocci, "Digital Systems Principles and Applications", Pearson Education Limited e, 12th edition, ISBN 978-0-134-22013-0, 2017. 5. Shuqin Lou, Chunling Yang, "Digital Electronic Circuits" Science Press, 4th edition, ISBN 978-3-11-061466-4, 2019.	NO Yes Yes Yes NO
Recommended Texts	1. A. SAHA, and N. MANNA, "Digital Principles and Logic Design" Infinity science press LLC, ISBN: 978-1-934015-03-2, 2007. 2. M. M. Mano, and M. D. Ciletti "Digital Design" Pearson Education , 5th edition , ISBN-13: 978-0-13-277420-8, 2013.. 3. M. Rafiquzzaman, "Fundamentals of Digital Logic and Microcontrollers" John Wiley & Sons, Inc., 6th edition, ISBN 978-1-118-85579-9, 2014. 4. D. P. Kothari, and J. S. Dhillon "digital circuits and design" Pearson education, ISBN 978-93-325-4353-9, 2015. 5. Ata Elahi, "Computer Systems", Springer, ISBN 978-3-319-66774-4, 2018.	Yes Yes Yes No NO
Websites	https://www.allaboutcircuits.com/textbook/digital/ https://www.circuit-diagram.org/editor/ https://circuitverse.org/simulator	

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

لغة البرمجة فجوال بيسك

Module Information معلومات المادة الدراسية					
Module Title	**Visual basics**			**Module Delivery**	
Module Type	basic			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11306				
ECTS Credits	**3**				
SWL (hr/sem)	**75**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader	Alia abduhussien Lafta		**e-mail**	Coj.alia@atu.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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	43. Explain the concepts of visual basic . 44. Describe the difference between loop and jumping instruction. 45. Explain the operation of all loop instruction.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	63. Have will be able to be completed a basic computer literacy course (e.g., CIS100, BIT1150, INFS1010) or receive permission of instructor 64. Be self-motivated 65. Be computer savvy and feel VERY comfortable getting around on the computer 66. Have the ability to troubleshoot their own computer problems 67. Any computer programming experience is helpful but not necessary.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Concept of visual basics Course Introduction • The Visual Basic Interface • Variables, Constants and Calculations • Decision Making • The IDE Debugger Part B – visual basics programming Menus, Subprocedures and Functions • Creating Object-Oriented Programs • Lists, Looping and Printing • Arrays and Structures -

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• Interactive lecturing style, with opportunities for questions.

	• Encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. • Interactive simulation for the logic circuits. • Make tutorial questions for formative feedback. • Assessments related to students' answers are delivered with scientific comments.

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	3.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	27	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.8
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	10% (10)	5 and 11	L #2, #3 and #8, #9
	Assignments	2	10% (10)	7 and 14	L #6, #7 and #13, #14
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #10 and #12
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	Identify Visual Basic components
Week 2	Identify Visual Basic instructions
Week 3	Understand Object-Oriented Programming
Week 4	Organize application development
Week 5	Design and create forms

Week 6	Build Menus
Week 7	Program using decision statements and loops
Week 8	Mid-term Exam
Week 9	Follow Visual Basic application development steps
Week 10	Code Global, Module, and Form level events, procedures, variables, and constants
Week 11	Identify Visual Basic data handling
Week 12	Use the Debug Tool
Week 13	Develop menu item, Help button, and context sensitive Help
Week 14	Preparing for final exam global review process
Week 15	Final exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	i)Study of VB environment with following details: Textbox, Label, Combo, List
Week 2	i)Study of VB environment with following details: Check boxand Option Buttons Form and their Types
Week 3	Design of Forms to perform mathematical operations: Addition,
Week 4	Subtraction,
Week 5	Multiplication
Week 6	Divisions using Text box, Labels, Command buttons
Week 7	Lab 7: exam
Week 8	Design of Forms to perform following operations: Use of Date, Time and Mathematical functions using Text box,
Week 9	Labels, Combo box, Command buttons
Week 10	To find the simple interest
Week 11	To find the greatest numbers among three numbers
Week 12	To find the greatest and smallest among a list of numbers
Week 13	To calculate the sum of N numbers
Week 14	To check whether a given number is even or odd
Week 15	Lab 15: Design a 2-to-4-line decoder using logic gates.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	. Columbia Guide to Online Style by Janice R. Walker and Todd Taylor	yes
Recommended Texts	Columbia Guide to Online Style by Janice R. Walker and Todd Taylor	yes
Websites	https://www.macmillanlearning.com/college/us/online/cite6.html	

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

معادلات تفاضلية

Module Information معلومات المادة الدراسية			
Module Title	**Differential Equations**		**Module Delivery**
Module Type	**Basic**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**ATU11407**		
ECTS Credits	**7**		
SWL (hr/sem)	**175**		
Module Level	UGx1	**Semester of Delivery**	2

Administering Department		**College**	NETC
Module Leader	Asaad. S. Daghal	**e-mail**	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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. **Understanding Transform Theory**:
   - To provide students with a comprehensive understanding of Fourier series and Fourier transforms, enabling them to analyze and represent both periodic and aperiodic functions in the frequency domain.
2. **Application of Fourier Analysis**:
   - To equip students with the skills to apply Fourier analysis to solve practical problems in signal processing, communications, and other related fields, including the use of convolution in system analysis.
3. **Differential Equations Fundamentals**:
   - To introduce students to the fundamental concepts of ordinary differential equations (ODEs), including first-order and second-order equations, and to develop their ability to classify and solve these equations using appropriate techniques.
4. **Analytical Techniques for ODEs**:
   - To teach students various analytical methods for solving first-order and second-order ordinary differential equations, including separation of variables, integrating factors, and the method of undetermined coefficients.
5. **Complex Problem Solving**:

	○ To enhance students' problem-solving abilities by applying complex methods, such as variation of parameters, to find particular solutions of non-homogeneous differential equations. 6. **Real-World Applications**: ○ To emphasize the importance of differential equations in engineering and applied sciences by exploring their applications in modeling real-world phenomena, such as mechanical vibrations and electrical circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1: Fourier Series** **Learning Outcome**: Students will be able to represent periodic functions using Fourier series and calculate the Fourier coefficients for given functions, identifying even and odd properties. **2: Fourier Transform** **Learning Outcome**: Students will understand the concept of the Fourier transform and its application to aperiodic functions, including the ability to compute the Fourier transform and its inverse for various functions. **3: Properties of Fourier Transforms** **Learning Outcome**: Students will demonstrate knowledge of the key properties of Fourier transforms, including linearity, time and frequency shifting, and the convolution theorem. **4: Convolution Theorem and Fourier Integral** **Learning Outcome**: Students will be able to apply the convolution theorem in signal processing and compute Fourier integrals for non-periodic functions, linking them to their Fourier transforms. **5: First Order Ordinary Differential Equations** **Learning Outcome**: Students will solve first-order ordinary differential equations using various methods such as separation of variables, exact equations, and integrating factors, differentiating between homogeneous and non-homogeneous cases. **6: Second Order Ordinary Differential Equations** **Learning Outcome**: Students will analyze and solve second-order ordinary differential equations, including homogeneous equations with constant coefficients, using methods such as characteristic equations, undetermined coefficients, and variation of parameters. These outcomes provide a structured approach to learning, allowing students to build on their knowledge each week.
Indicative Contents المحتويات الإرشادية	- Fourier transform - Ordinary differential equation - Bernoulli equation - High order differential equations

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Use the following Learning, Teaching, and Assessment strategies Learning Strategies:

	1. **Interactive Lectures**: o Use multimedia presentations and real-world examples to introduce key concepts of Fourier series, Fourier transforms, and differential equations. o Encourage student participation through questions and discussions to reinforce understanding. 2. **Problem-Based Learning**: o Assign practical problems that require the application of Fourier analysis and differential equation techniques. o Facilitate group work where students collaborate to solve complex problems, fostering teamwork and critical thinking. 3. **Hands-On Workshops**: o Organize workshops where students can use software tools (e.g., MATLAB, Python) to visualize Fourier transforms and solve differential equations. o Provide guided practice sessions to help students build confidence in applying mathematical methods. 4. **Flipped Classroom**: o Encourage students to review lecture materials and video tutorials at home, allowing class time to be dedicated to problem-solving and collaborative discussions. o Provide online resources and forums for students to ask questions and engage with peers outside of class. 5. **Case Studies and Applications**: o Present case studies that demonstrate the real-world applications of Fourier analysis and differential equations in engineering and science. o Invite guest speakers from industry to share their experiences and the relevance of these concepts in practical scenarios. 6. **Regular Assessments and Feedback**: o Implement formative assessments (quizzes, homework) to gauge student understanding and provide timely feedback. o Use peer review and self-assessment strategies to encourage reflection on learning progress and areas for improvement.

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	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	112	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	7.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Transform Theory; Fourier series; periodic function; even and odd functions
Week 2	Fourier transform; aperiodic functions; properties.
Week 3	Convolution theorem; Fourier Integral.
Week 4	Ordinary differential equation of first order: - basic concepts in differential equations; variable separable
Week 5	Equation's reducible to separable form
Week 6	Homogenous equations and non-homogenous equations
Week 7	Exact differential equations;
Week 8	Non exact differential equations; integrating factor
Week 9	linear first order differential equations
Week 10	Bernoulli equation
Week 11	Ordinary differential equations of second order: - homogenous linear second order; homogeneous with constant coefficients; roots of characteristics equations,'initial condition and boundary condition
Week 12	Non homogeneous second order differential equations; complex methods for obtaining particular solutions (undetermined coefficients);
Week 13	Variation of parameters method;
Week 14	High order differential equations: - basic concepts; solution of high order characteristics equation.
Week 15	Applications of Differential Equations
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus 14th edition	Yes
Recommended Texts	Calculus 10th edition by Anton , Bivens , and Davis	Yes
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

جرائم حزب البعث

Module Information

معلومات المادة الدراسية

Module Title	**Baath Party crimes**		**Module Delivery**
Module Type	**Suplement**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**ATUU211**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		

Module Level	UGx	**Semester of Delivery**	2
Administering Department		**College**	NETC
Module Leader	Hiader Abd Al-Jaleel	**e-mail**	
Module Leader's Acad. Title	Assistant professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail

Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**Version Number**	1.0

Relation With Other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	1 التعرف على ماهية الجريمة لغة واصطلاحاً وماهية أقسام الجرائم. 2. التعرف على جرائم نظام البعث. 3. تنمية وعي الطلبة بجرائم نظام البعث. 4. دراسة الجرائم التي ارتكبها نظام البعث على مدى سنوات طويلة واثارها النفسية والاجتماعية . 5. التعرف على صور انتهاكات حقوق االنسان وجرائم السلطة والتعرف على الجرائم البيئية لنظام البعث في لعراق. 6. تعزيز الوعي بحقيقة ما جرى من مآسي المقابر الجماعية المرتكبة من النظام البعثي في العراق
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 تمكين الطالب من معرفة المفاهيم النظرية للجرائم وأركان الجرئم . 2. تمكين الطالب من معرفة أقسام الجرائم . 3. تمكين الطالب من معرفة قانون المحكمة الجنائية العراقية العليا لسنة 2005. 4. يتعلم الطالب أنواع الجرائم الدولية على وفق النظام االساسي للمحكمة الجنائية الدولية. 5. يتمكن الطالب من فهم موقف النظام البعثي من الدين من خلال فهم عقيدة النظام السياسي 6. يتمكن الطالب من التعرف على صور أنتهاكات القوانين العراقية وأنتهاكات حقوق االنسان وجرائم السلطة. 7. يتعرف الطالب على أماكن السجون لنظام البعث. 8. معرفة الطالب بالجرائم البيئية وآثار الجرائم البيئية لنظام البعث ويتعرف على جرائم المقابر الجماعية.
Indicative Contents المحتويات الإرشادية	1- جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا لعام 2005م، 2- الجرائم النفسية واالجتماعية وآثارها وابرز انتهاكات النظام البعثي في العرا 3- الجرائم البيئية لنظام البعث في العراق، جرائم المقابر الجماعية
Strategies	1زيادة وعي الطالب بالجرائم التي ارتكبها نظام البعث في العراق وحقيقة ما جرى من مآسي وويالت بحق الشعب العراقي. 2-اكتساب الطالب ثقافة عامة بماهية الجرائم واركانها واقسامها وموقف المشرع العراقي منها. 3- زيادة وعي الطالب بموقف القانون الدولي والمحاكم الجنائية الدولية من الجرائم والانتهاكات التي ترتكبها الانظمة السلطوية.

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	/15 =1.218	**Structured SWL (hr/sem) (SSWL)** الحمل الدراسي المنتظم للطالب خلال الفصل	18
Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	/15=2.132	**Unstructured SWL (hr/sem)(USSWL)** الحمل الدراسي غير المنتظم للطالب خلال الفصل	32
		Total SWL (hr/sem)	50

	الحمل الدراسي الكلي للطالب خلال الفصل

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered / Syllabus
1	محاضرة تعريفية عن المادة واهميتها.
2	التعريف بالجريمة لغة واصطالحا، أقسام الجريمة، جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا عام 2005م ، أنواع الجرائم الدولية.
3	القرارات الصادرة من المحكمة الجنائية العليا، وأبرز القضايا التي نظرت فيها المحكمة.
4	الجرائم النفسية، اليات الجرائم النفسية.
5	اثار الجرائم النفسية، الجرائم الاجتماعية
6	عسكرة المجتمع، موقف النظام البعثي من الدين.
7	انتهاكات القوانين العراقية، صور انتهاكات حقوق االنسان، جرائم السلطة.
8	بعض قرارات الانتهاكات السياسية والعسكرية لنظام البعث، السجون لنظام البعث.
9	الجرائم البيئية لنظام البعث في العراق: التلوث الحربي الاشعاعي – استعمال الاسلحة المحرمة دولياً ومخاطر الالغام.
10	التلوث بالمواد المشعة، أثار أستخدام الاسلحة المحرمة دولياً
11	تدمير المدن والقرى(سياسة االرض المحروقة)
12	تجفيف الاهوار أثارها البيئية والاجتماعية والاقتصادية
13	تجريف بساتين النخيل والاشجار والمزروعات.
14	جرائم المقابر الجماعية، أحداث المقابر الجماعية المرتكبة من النظام البعثي في العراق.
15	التصنيف الزمني لمقابر الابادة الجماعية في العراق
16	الامتحان النهائي

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	المنهج المقر الدراسي للجامعات من قبل الوزارة	
Recommended Texts		
Websites		

APPENDIX:

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

اتصالات تناظرية

Module Information معلومات المادة الدراسية		
Module Title	**Analog communication**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab**
Module Code	08ATU114	

ECTS Credits	**7**		☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
SWL (hr/sem)	**175**				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader	Ahmad H. Hadi		**e-mail**	Coj.Ahmadhadi@atu.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	1/10/2024		**Version Number**	1.0	

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. To define the main terms of the analog communication systems. 2. To introduce the concept of modulation. 3. To learn the types of modulation techniques.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the parameters of the analog communication system. 2. Recognizing the differences between modulation types. 3. Define the interaction between message signal and carrier signal. 4. Define the theory behind the generation of each modulation type. 5. Understanding the reaction between signals and noise.
Indicative Contents المحتويات الإرشادية	1. Modulation. 2. Amplitude modulation 3. Frequency modulation 4. Analog pulse modulation

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6.5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**175**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1-2	Modulation: Linear modulation, double-sideband modulation AM and DSB modulators and transmitters; SSB and VSB; frequency conversion; detection and receivers; frequency division multiplexing.
Week 3-6	Amplitude modulation: the AM transmission: the AM spectrum; power considerations; phasor representation; AM modulators; another AM transmitter, Application of AM Systems.
Week 7-10	Frequency modulation: fundamental concepts; Frequency modulation: the FM spectrum; phasor representation; narrowband FM; broadband FM; FM generation; FM transmitter; interference and noise; the PM spectrum PM/FM transmitter.
Week 11	Mid – Term Exam.
Week 12-13	Noise in CW modulation: system models and parameters; interference noise in linear modulation; noise in exponential modulation; comparison of CW modulation system
Week 14-15	Pulse modulation: Analog pulse modulation; PAM, PDM and PPM, pulse-code modulation PCM, DM, and DPCM; time-division multiplexing
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1-2	Am modulation
Week 3	Design Amplitude modulation circuit by Student.
Week 4	Am demodulation
Week 5	Design Amplitude demodulation circuit by Student.
Week 6	Phase Locked Loop (PLL)
Week 7-9	FM modulation using different circuits (CD4046, 555 timer, 565 …etc)
Week 10	FM demodulation
Week 11	Midterm exam
Week 12-15	PM modulation (PAM, PDM and PPM)
Week 16	**Final exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1- Introduction to Communication Systems By F. G. Strelmer	yes
Recommended Texts	1- Analog communication textbook by sanjay sharma. 2-Modern digital and analog communication systems by B. P. Lathi & Zhi Ding	no
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

دوائر الكترونية متكاملة

Module Information معلومات المادة الدراسية			
Module Title	Integrated electronic circuits	**Module Delivery**	
Module Type	C	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	09ATU114		
ECTS Credits	7		
SWL (hr/sem)	175		
Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	NETC
Module Leader	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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	46. Understanding of Integrated Circuits. 47. To Define types of Integrated Circuits. 48. To Know the application on integrated Circuits. 49. To understand the design of integrated Circuits.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Enabling student to know the concepts of IC 2. learning the type of IC. 3. Enabling student to know about the Construction of IC. 4. Enabling student to design Many application of IC. 5. Understand the basic operation of some types of IC 6. Enabling student to Select the suitable IC for the applications
Indicative Contents المحتويات الإرشادية	• introduction to IC • Working with Power point • Theoretical lectures • Lab.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	different examples. Using different styles of discussion that aim to connect the theoretical and practical sides. Asking questions and giving exercises that require analysis and conclusions related to lectures. Encourage students to participate in discussions and do the practical work. Encourage students to work in groups..

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	97	**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, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1-2	Introduction to Integrated Circuits, Types of integrated circuits, Analog Integrated Circuits, digital integrated circuits, Programmable Integrated Circuits, Integrated Circuit Applications, Advantages of integrated circuits, Future trends in integrated circuit technology
	operational amplifier, applications (linear and non-linear applications): inverting, noninverting, voltage follower, adder, subtractor, integrator and differential, comparator, zero crossing detector, voltage bounding, log and antilog, Analog to Digital Converters, Digital to Analog Converters, active filters design (Butterworth filter).

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

		Material Covered
Week 1	&2	Op-Amp Voltage Followers and Noninverting Amplifiers, Inverting Amplifiers
Week 3	&4	Summing and Difference Amplifiers
Week	5	Differentiator and integrator
Week 6	&7	Lowpass, Bandpass and High pass active Filters
Week	8	Midterm exam
Week 9	&10	Analog to Digital Converters, Digital to Analog converters
Week 11	& 12	Different Oscillators

Week 13 & 14		555 IC Operating as Astable Multivibrator, 555 IC Operating as Bistable Multivibrator, 555 IC Operating as Monostable Multivibrator
Week 15		Final exam
Week 3-10		
Week 11-12		Feedback Amplifier, Oscillators: Positive feedback and oscillation, Stability of Oscillation, Oscillators using OP-AMP: Phase-shift Oscillator, Wien Bridge Oscillator, Hartley Oscillator, Crystal Oscillator.
Week 13-15		Timing circuits 555 timer applications, 555 timer as a mono stable multivibrator and a bistable multivibrator
Week 16		Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Electronic Devices and Circuit Theory", Robert Boylestad, Louis Nashelsky, 10th Edition , 2009.	Yes
Recommended Texts	electronic-devices-9th-edition-by-floyd	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

اللغة الإنكليزية 2

Module Information معلومات المادة الدراسية					
Module Title	**English2**			**Module Delivery**	
Module Type	**S**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU221				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader	Mohammed Salim		**e-mail**	E-mail	
Module Leader's Acad. Title	Asst. Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/10/2024		**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 course is to provide English learners with integrated language skills such as reading, listening and writing resulting in a level of basic language knowledge. 2-This course will focus on grammar rules, basic word knowledge and usage, reading comprehension, reading out of the lesson, and Paragraph writing.

	3- A student may be able to listen to native speakers and speak English Language. 4- A student may be able to write and have creativity in his writing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Uses expressions of Quantity in elementary level of English. 2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task. 3- Defines basic Modals and employ them in elementary level of communication and writing skills. 4- Translates sentences in elementary level from English to another language. 5- Interprets the texts written in elementary level of English.
Indicative Contents المحتويات الإرشادية	**Language** is a rule-governed behavior. It is defined as the comprehension and/or use of a spoken (i.e., listening and speaking), written (i.e., reading and writing), and/or **other communication symbol system** (e.g., American Sign Language). **Spoken and written language** are composed of receptive (i.e., listening and reading) and expressive (i.e., speaking and writing) components. Spoken language, written language, and their associated components (i.e., receptive and expressive) are each a synergistic system comprised of individual language domains (i.e., phonology, morphology, syntax, semantics, pragmatics) that form a dynamic integrative whole **Phonology** study of the speech sound (i.e., phoneme) system of a language, including the rules for combining and using phonemes. **Morphology** study of the rules that govern how morphemes, the minimal meaningful units of language, are used in a language. **Syntax** the rules that pertain to the ways in which words can be combined to form sentences in a language. **Semantics** the meaning of words and combinations of words in a language.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- Uses the available material to increase his efficiency. 2- Constructs sentences in Present Perfect Tense, Simple Future Tense and Going to Future Tense both in an oral and written task. 3-Defines basic Modals and employ them in elementary level of communication and writing skills. 4- Develop and enhance students' language skills to communicate in English properly. 5- Interprets the texts written in elementary level of English.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	18	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1.2

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	32	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2.1
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**50**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	

Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Headway book for learning English	Yes
Recommended Texts	Skills in writing and Learning English	No
Websites	https://www.bbc.co.uk/learningenglish/	

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

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MODULE DESCRIPTOR FORM

نموذج وصف المادة الدراسية

لغة عربية 2

Module Information معلومات المادة الدراسية			
Module Title	**Arabic language**	**Module Delivery**	
Module Type	**Suplement**	**Theory**	
Module Code	**ATU220**		
ECTS Credits	**2**		
SWL (hr/sem)	**50**		
Module Level	UGx	**Semester of Delivery**	2

Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/10/2024	**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	5- تعريف الطلبة اهم المفاتيح الاساس في التعامل بلغة عربية فصيحة خالية من اي الأخطاء. 6- رفع القدرات التعبيرية للطالب، ومساعدتهم على استخدام العبارة المناسبة بشكل صحيح وواضح. 7- تدريب الطلبة على التنظيم المنطقي للأفكار باللغة العربية الفصحى. 8- جعل الطلبة قادرين على اكتساب خزين لغوي من الكلمات والتعابير الفصيحة.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	5- تعلم اساليب اللغة العربية . 6- استخدام علامات الترقيم أثناء الكتابة. 7- تعلم كيفية تحليل النصوص الأدبية. 8- التدريب على القراءة الواضحة والالقاء.
Indicative Contents المحتويات الإرشادية	10- توضيح أهمية اللغة العربية وفوائدها للطلبة من غير اختصاص اللغة العربية. 11- تفسير بعض الايات القرىنية 12- تحليل بعض القصائد العربية. 13- قواعد اللغة العربية وأهميتها. 14- الأسماء، أنواعها، الضمائر 15- النكرة والمعرفة. 16- اعراب بعض الايات القرىنية، الابيات الشعرية. 17- علامات الترقيم واهميتها في اللغة العربية. 18- شرح موضوع العدد ، وماهي اقسامه.
Strategies	-المحاضرة والمشاركة. -المناقشة والحوار. -العصف الذهني. -كتابة التقارير عن الموضوع. - السؤال والجواب

Student Workload (SWL)

الحمل الدراسي للطالب

Structured SWL (h/w) الحمل الدراسي المنتظم للطالب أسبوعيا	/15 =1.218	**Structured SWL (hr/sem) (SSWL)** الحمل الدراسي المنتظم للطالب خلال الفصل	18
Unstructured SWL (h/w) الحمل الدراسي غير المنتظم للطالب أسبوعيا	/15=2.132	**Unstructured SWL (hr/sem)(USSWL)** الحمل الدراسي غير المنتظم للطالب خلال الفصل	32
		Total SWL (hr/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
	Homework	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1-7
	Final Exam	3 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

Week	Material Covered Syllabus
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	-2	
Recommended Texts	-2	
Websites		

APPENDIX:

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

تحليلات هندسية

Module Information معلومات المادة الدراسية		
Module Title	Engineering Analysis	**Module Delivery**

Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**ATU11501**	
ECTS Credits	**5**	
SWL (hr/sem)	**125**	

Module Level	UGx1	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader	Asaad. S. Daghal	**e-mail**	ad466kent@atu.edu.iq
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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. **Comprehensive Understanding:** Develop a holistic understanding of complex analysis, Laplace transforms, and partial differential equations. 2. **Problem-Solving Skills:** Enhance analytical and problem-solving skills through the application of theoretical concepts to practical scenarios. 3. **Interdisciplinary Connections:** Foster the ability to connect mathematical theories to applications in science, engineering, and technology.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1. Z-Transform** Understanding and Application, Properties and Pairs, Inverse Z-Transform, Discrete-Time System Analysis. **2. Laplace Transform** Definition and Basic Functions, Inverse Transform, Differential Equations, Transform Properties: **3. Partial Differential Equations** Fundamental Concepts, Separation of Variables, D'Alembert's Solution **4. Complex Analytic Functions** Complex Functions and Properties, Analyticity and Cauchy-Riemann Equations, Laplace's Equation and Rational Functions. **5. Complex Integrals** Line Integrals in the Complex Plane, Properties of Complex Line Integrals, Cauchy's Integral Formula. **6. Special Functions** Gamma and Beta Functions, Applications of Special Functions.
Indicative Contents المحتويات الإرشادية	**1. Z-Transform** **2. Laplace Transform** **3. Partial Differential Equations** **4. Complex Analytic Functions** **5. Complex Integrals** **6. Special Functions**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**1. Lectures:** Introduce key concepts using structured presentations and visual aids. **2. Interactive Tutorials:** Conduct problem-solving sessions and encourage peer collaboration. **3. Hands-On Exercises:** Utilize mathematical software for computational tasks. **4. Case Studies:** Discuss real-world applications and invite industry speakers. **5. Assignments and Projects:** Assign individual problems and facilitate group projects. **6. Discussion Forums:** Use online platforms for peer interaction and guide discussions. **7. Assessment Methods:** Implement formative quizzes and summative exams. **8. Self-Directed Learning:** Provide recommended readings and encourage study groups. **9. Feedback Mechanisms:** Offer regular feedback on assignments and encourage reflective practices for improvement.

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	62	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects /Siminar	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
	Total assessment		100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Z-Transform: Basics of Z-Transform; Definition and significance of the Z-transform; Overview of discrete-time signals and systems; Properties: linearity, time shifting, and region of convergence (ROC)
Week 2	Key Techniques and Applications: Z-Transform Pairs and Inversion; Common Z-transform pairs; Techniques for finding the inverse Z-transform (power series and partial fractions); Z-transform of common signals (step, impulse, exponential)
Week 3	**System Analysis and Applications**: Analysis of discreet-time systems using Z-transform; Frequency response and stability analysis
Week 4	Laplace transformation: - definition of Laplace transform; Laplace transform of some elementary function
Week 5	Linearity, time shifting, and initial/final value theorems
Week 6	unit step function; ramp function; impulse function.
Week 7	Inverse of Laplace transforms; Laplace transform of derivative and transformation of ordinary differential equations
Week 8	partial fractions: solution of differential equation by using Laplace transform
Week 9	Partial differential equations: - basic concepts; separation of variables; D'Alembert's solution of wave equation.
Week 10	**Mid -Term Exam**
Week 11	Complex analytic functions: - complex function; limit; derivative;
Week 12	Analytic function; Cauchy-Rieman equations;
Week 13	Laplace's equation; rational function; root.
Week 14	Complex Integrals: - Line integral in the complex plane; basic properties of the complex line integral; Cauchy's integral formula; the derivatives of an analytic function

Week 15	**Special functions: - Gamma function; Beta function**
Week 16	**Final Exam**

مصادر التعلم والتدريس **Learning and Teaching Resources**		
	Text	**Available in the Library?**
Required Texts	Advanced Engineering Mathematics" by Erwin Kreyszig	Yes
Recommended Texts	Engineering Mathematics" by K.A. Stroud and Dexter J. Booth	No
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

مخطط الدرجات **Grading Scheme**				
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

احتمالية واحصاء

معلومات المادة الدراسية **Module Information**					
Module Title	Probability and Statistics			**Module Delivery**	
Module Type	**Basic**			☒ **Theory**	
Module Code	**ATU11502**			☐ **Lecture**	
ECTS Credits	**4**			☐ **Lab**	
SWL (hr/sem)	**100**			☒ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department		**College**	NETC		
Module Leader	Asaad. S. Daghal	**e-mail**	ad466kent@atu.edu.iq		
Module Leader's Acad. Title	Assist. Prof.	**Module Leader's Qualification**	Ph.D.		
Module Tutor	Name (if available)	**e-mail**			
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq		
Scientific Committee Approval Date	01/05/2025	**Version Number**	1.0		

العلاقة مع المواد الدراسية الأخرى **Relation with other Modules**

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	4. **Understand Basic Probability**: Learn the foundational concepts of probability, including sample spaces, events, and probability axioms. 5. **Apply Probability Distributions:** Use common distributions (e.g., binomial, normal) and key theorems like Bayes' and the central limit theorem. 6. **Analyze Random Variables:** Calculate expected values, variances, and apply these concepts to model stochastic processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. **Basic Probability Concepts:** Students will be able to define and calculate probabilities for simple and compound events, applying the axioms of probability. 2. **Probability Distributions and Theorems:** Students will be able to apply probability distributions and key theorems to solve problems and make predictions. 3. **Random Variables and Expectation:** Students will be able to analyze random variables, calculate expected values and variances, and model real-world stochastic processes.
Indicative Contents المحتويات الإرشادية	1. Overview of set theory. 2. Random variables and probability density functions. 3. Joint, Marginal and conditional distributions. 4. Characteristic functions.

Learning and Teaching Strategiesاستراتيجيات التعلم والتعليم

Strategies	1. State the need for Mathematics with Engineering Studies and Provide real-life examples. 2. Support and guide the students for self–study. 3. Assigning homework, grading assignments, quizzes, and documenting students' progress. 4. Encourage the students to group learning to improve their creative and analytical skills. 5. Show short related video lectures.

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluationتقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Overview of set theory and essential mathematical concepts; Random experiments and probability axioms;
Week 2	Conditional probability and Bayes' rule;
Week 3	Counting methods
Week 4	Discrete random variables and probability mass functions;
Week 5	functions of Discrete random variables
Week 6	Continuous random variables and probability density functions;
Week 7	Functions of Continuous random variables
Week 8	Cumulative distribution functions; Expectation, variance, and higher-order moments
Week 9	Joint distributions of discrete and continuous variables; Marginal and conditional distributions;
Week 10	**Mid -Term Exam**
Week 11	Covariance and correlation; Functions of multiple random variables
Week 12	Definition and properties of moment-generating functions;
Week 13	Characteristic functions and their applications;
Week 14	Inequalities in probability (e.g., Markov's and Chebyshev's inequalities)
Week 15	Revision of whole materials
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	*A First Course in Probability* by Sheldon Ross	Yes
Recommended Texts	*Probability and Statistics for Engineering and the Sciences* by Jay L. Devore	No
Websites	Khan Academy - Probability and Statistics	

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

هوائيات وانتشار موجات

Module Information معلومات المادة الدراسية					
Module Title	**Antenna and Wave propagation**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	ATU11503				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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. To provide an introduction to the fundamentals of electromagnetic wave propagation in both guided structures and open media 8. Introduce essentially a review of basic electromagnetic theory. 9. Introduce the fundamental principles of antenna theory and apply them to the analysis, design, and measurements of antennas. 10. It is devoted to the study of antenna arrays. 11. introduce the student to a technology that will advance antenna theory and design, and revolutionize wireless communications 12. deals with the issues related to the propagation of radio waves
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	6. Understanding the relative between Maxwell's equation and antenna system. 7. Recognize the radiation mechanism. 8. Basic understanding of the Properties of Antenna. 9. Comprehend the antenna parameters. 10. Categorise and analysis most types of linear antenna. 11. Basic knowledge about antenna array & the wave propagation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Theoretical content 1- Review of basic electromagnetic theory. 2- The field computation to antennas. 3- Study of antenna arrays & Propagation of radio waves. Part B – LAB-

	1- Design, analysis, and visualization of antenna elements and arrays. 2- Compute impedance, current distribution, radiation patterns. 3- Antenna coordinate systems & RF propagation models.

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 experiments involving some sampling activities that are interesting to the students.

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

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	10	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	Maxwell equations -Antenna Definition - Properties of Antenna - Types of Antennas - Block Diagram of Communication Systems - The Isotropic - Radiation Mechanism.
Week 2	Antenna Parameters - Radiation Pattern - Field Regions - Radian and Steradian - Radiation Intensity
Week 3	Pattern beamwidth- Directivity - Power Gain
Week 4	Input Impedance of Antenna
Week 5	Antenna Polarization- Polarization Mismatch
Week 6	Radiation Efficiency - Effective Length - Effective Area - Antenna Bandwidth
Week 7	Antennas In Communication (Friis Formula) - Antennas in Radar System
Week 8	Thin Linear Antenna –Short Dipole
Week 9	Monopole - Dipole Antenna - Loop antenna-small loop
Week 10	**Mid-Term Exam**
Week 11	Aperture Antenna - Folded Dipole Antenna - Yagi-Uda Antenna
Week 12	Helical antenna -Spiral antenna - Microstrip patch antenna
Week 13	Antenna Arrays - Linear Array - Pattern Multiplication - Two Element, Uniform Array - End Fire Array - Broad Side Array
Week 14	Radio Wave Propagation - Ground Wave - Free Space Propagation - Ground Reflection - Surface Waves - Diffraction -.
Week 15	Wave Propagation in Complex Environment - Troposphere Propagation - Troposphere Scatter - Ionosphere Propagation
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Antenna Library- Structure of Antenna- Properties of Antenna- Plot Radiation Pattern of Antenna- Plot Azimuth and Elevation Pattern of Antenna
Week 2	Directivity of Antenna- E-fields of Antenna- Polarizations and Axial Ratio of Antenna
Week 3	Return Loss and Voltage Standing Wave Ratio (VSWR) of Antenna
Week 4	Current and Charge Distribution of Antenna- Mesh of Antenna
Week 5	Rectangular Coordinate System- Spherical Coordinate System- Polar Plot
Week 6	Design and Analysis Using Antenna Designer
Week 7	Array Modeling and Analysis
Week 8	RF Propagation and Visualization
Week 9	Introduction to Computer Software Technology (CST)
Week 10	**Mid-Term Exam**
Week 11	Analysis of Monopole and dipole Antenna parameters using CST
Week 12	Analysis of Yagi-Uda Antenna parameters using CST
Week 13	Analysis of Spiral antenna parameters using CST
Week 14	Analysis of Microstrip patch antenna parameters using CST
Week 15	Analysis of Array Antenna parameters using CST
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Antenna Theory Analysis and Design by C.A> Balanis, John Wille Sons	Yes
Recommended Texts	Elements of Electromagnetics by Matthew N. O. Sadiku (2nd Edition)	No
Websites	https://www.antenna-theory.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
الاتصالات الرقمية

Module Information معلومات المادة الدراسية					
Module Title	Digital Communications			**Module Delivery**	
Module Type	**Core**			☒ **Theory**	
Module Code	ATU11504			☐ **Lecture**	
ECTS Credits	**6**			☒ **Lab**	
SWL (hr/sem)	**150**			☐ **Tutorial**	
				☐ **Practical**	
				☐ **Seminar**	
Module Level	UGx1	**Semester of Delivery**	1		
Administering Department	Communications Techniques Department	**College**	Technical College of Najaf		
Module Leader		**e-mail**			
Module Leader's Acad. Title		**Module Leader's Qualification**			
Module Tutor	Name (if available)	**e-mail**			
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq		
Scientific Committee Approval Date	01/05/2025	**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- To provide students with a foundational understanding of digital communication systems. 2- To introduce the principles of signal representation, sampling, quantization, and modulation. 3- To develop students' ability to analyze and compare various digital modulation techniques. 4- To expose students to practical applications of digital communication, such as OFDM and spread spectrum.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: 1. Explain the differences between analog and digital communication. 2. Apply the sampling theorem and understand the phenomenon of aliasing. 3. Describe & analysis the process of Pulse Code Modulation (PCM) and its variations. 4. Understand and mitigate the effects of inter-symbol interference (ISI). 5. Describe and compare various digital modulation tech. (ASK, FSK, PSK, QAM, etc.). 6. Analyze the error performance of binary and multilevel modulation systems. 7. Explain the principles of OFDM and spread spectrum techniques.

Indicative Contents المحتويات الإرشادية	1. Introduction to digital communication systems and its elements. 2. (PCM), variations (delta modulation, DPCM), ISI, equalization, matched filter. 3. Binary digital modulation, coherent and non-coherent detection, error performance. 4. Multilevel modulation (QAM, QPSK, OQPSK, MSK, MFSK, M-ary PSK/QAM),

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

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

Module Evaluation تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Digital Communications:** Overview, Analog vs. digital communications, and Elements of a digital communication system.
Week 2	**Signal Representation & Sampling:** Baseband signal representation, Sampling theorem, and, Aliasing, and practical sampling considerations.
Week 3	**Quantization & Pulse Code Modulation (PCM):** Pulse Code Modulation (PCM) and Quantization process.
Week 4	**PCM System Analysis:** Representation of binary data, Noise consideration in PCM system, and SNR performance of PCM.
Week 5	**Modifications of PCM:** Limitations and modifications of PCM, Delta modulation, Delta-Sigma modulation, Adaptive delta modulation, and Differential PCM (DPCM).
Week 6	**Inter-Symbol Interference (ISI) and Equalization:** ISI, Pulse shaping, Equalization techniques, and adaptive equalization.
Week 7	**Matched Filter and Optimal Reception:** The matched filter receiver and optimal receiver design.
Week 8	**Digital Modulation:** Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Phase Shift Keying (PSK).
Week 9	**Digital Modulation:** Differential PSK (DPSK), Coherent and non-coherent detection, and Error performance analysis of binary systems.

Week 10	**Mid-Term Exam**
Week 11	**Digital Modulation:** Quadrate Amplitude Modulation (QAM), Quadrate Phase Shift Keying (QPSK), Offset-QPSK (OQPSK), Minimum Shift Keying (MSK).
Week 12	**Digital Modulation:** Multilevel modulation techniques (MFSK, M-ray PSK& M-ray QAM), Error performance of M-ray systems.
Week 13	**Digital Modulation:** Comparison between performance of digital modulation types, and Modulation trade-offs (Bandwidth, Power, Complexity)
Week 14	**Applications I:** Orthogonal Frequency Division Multiplexing (OFDM)
Week 15	**Applications II:** Spread spectrum (Direct sequence and Frequency hopping spread spectrum), and Multiple access (CDMA, TDMA, FDMA).
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Pulse generation circuit
Week 2	Sampling Theorem
Week 3	Quantization: Sample and hold circuit
Week 4	PAM modulation and demodulation
Week 5	PPM modulation and demodulation
Week 6	PCM modulation
Week 7	PCM demodulation
Week 8	ASK modulation and demodulation
Week 9	FSK modulation and demodulation
Week 10	**Mid-Term Exam**
Week 11	PSK modulation and demodulation
Week 12	PFM modulation and demodulation
Week 13	PWM modulation and demodulation
Week 14	DPCM modulator
Week 15	DOCM demodulator
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Digital Communications, by John G. Proakis and Masoud Salehi.	No
Recommended Texts	2- Analog communication textbook by sanjay sharma. 3- Modern digital and analog communication systems by B. P. Lathi & Zhi Ding	No
Websites		

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

معالج دقيق

Module Information معلومات المادة الدراسية					
Module Title	Microprocessor			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11505				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx1		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية			
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	13. To view the development of microprocessor. 14. To study the hardware of 8085 microprocessor. 15. To learn programing the 8085 microprocessor. 16. To introduce some applications of 8085 microprocessor.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	12. Understanding hardware of 8085 microprocessor. 13. Programming 8085 microprocessor. 14. Understanding machine language. 15. Understanding the buses types in microprocessor. 16. Studying the interfacing between microprocessors and memories blocks
Indicative Contents المحتويات الإرشادية	5. 8085 microprocessor hardware. 6. 8085 microprocessor Programming. 7. Addressing modes. 8. Counter design using 8085 microprocessor.

Learning and Teaching Strategiesاستراتيجيات 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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 9	LO #1, #2, and #4, #5
	Assignments	2	10% (10)	2 and 12	LO #3 and #5
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #2 and #3
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	Architecture of 8085 microprocessor: development of microprocessors; block diagram; registers; ALU; control unit.
Weeks 2 &3	Pin out of 8085 microprocessor: Buses system; Control signals; some of digital circuits connected with 8085 microprocessor.
Weeks 4 &5	Timing Diagram: clock signals; 8085 microprocessor machine cycles; instruction fetch and execute cycle
Weeks 6 &7	Interrupts: definition of interrupts; interrupts types; overall structure of interrupts; operation of interrupts instructions.
Week 8	Stack and subroutine: definition of stack memory; PUSH & POP instructions; subroutine concepts and instructions; subroutines writing.
Week 9	Time delay and counters: time delay types; counter design using programming.
Week 10	**Mid-Term Exam**
Week 11	Addressing Modes: definitions of addressing modes; 8085 mic. addressing modes.
Weeks 12-13	Memories: types of memory; storage element; memory addressing; multi chips memory; interfacing between 8085 mic. and memory chips.
Week 14	I/O device interfacing: I/O ports; IN & OUT instructions; connections between 8085 mic. and I/O ports
Week 15	8086 microprocessor: block diagram; architecture; pin out; Introduction to programming.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Understanding the kit program
Week 2	Data transfer operations
Week 3	Arithmetic operation (8-bit summation & subtraction)
Week 4	Arithmetic operation (16-bit summation & subtraction)
Week 5	logic operation (AND, OR & EX-OR operations)
Week 6	Clear of set memory locations
Week 7	Summation of set memory locations contents
Week 8	Counting even numbers
Week 9	Summation of odd order numbers
Week 10	**Mid-Term Exam**
Week 11	Finding largest number
Week 12	BCD to binary & binary to BCD conversion.
Week 13	I/O ports connection
Week 14	Controlling LED matrix using 8085 mic.
Week 15	Controlling stepper motor using 8085 mic.
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Microprocessor Architecture, Programming and Applications with 8085, Ramesh S. Goankar, 5th Edition, Prentice Hall	yes
Recommended Texts	1- Microprocessors, Atul P. Godse & Deepali A. Godse	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

برمجة ماتلاب

Module Information
معلومات المادة الدراسية

Module Title	Matlab Programming	**Module Delivery**	
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11506		
ECTS Credits	**3**		
SWL (hr/sem)	75		
Module Level	UGx1	**Semester of Delivery**	1
Administering Department		**College**	NETC

Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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 MATLAB Environment** – Navigate the interface, execute basic commands, and manage workspaces. 2. **Work with Variables and Arrays** – Define variables, perform mathematical operations, and manipulate matrices. 3. **Use Control Structures and Functions** – Implement loops, conditional statements, and create user-defined functions. 4. **Create Basic Plots and Visualizations** – Generate and customize graphs for data representation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Navigate and Utilize MATLAB – Efficiently use the MATLAB interface, command window, and workspace. 2. Perform Mathematical and Logical Operations – Execute arithmetic, relational, and logical operations on variables and matrices. 3. Manipulate Arrays and Matrices – Create, modify, and perform indexing, slicing, and element-wise operations. 4. Implement Control Structures – Use loops (for, while) and conditional statements (if, else) to control program flow. 5. Develop and Use Functions – Write user-defined functions with input arguments and return values. 6. Generate Plots and Visualizations – Create 2D plots, customize graphs, and represent data visually. 7. Read and Write Files – Handle file input/output operations to store and retrieve data efficiently
Indicative Contents المحتويات الإرشادية	1. MATLAB Environment and Basic Operations 2. Variables, Arrays, and Control Structures 3. Functions and Data Visualization 4. File Handling and Data Processing

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 coding exercises, while at the same time refining and expanding their problem-

	solving and critical thinking skills. This will be achieved through interactive lectures, hands-on coding tutorials, and engaging programming tasks that involve real-world applications and challenges relevant to the students.

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	12	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Overview of MATLAB, interface navigation, executing basic commands.
Week 2	Defining variables, numerical and logical operations, working with strings.
Week 3	Creating and manipulating arrays, indexing, and matrix operations.
Week 4	Conditional Execution; Implementing conditional statements; Nested conditions and conditional expressions Using conditional statements (if, else, elseif)
Week 5	Loops; Understanding and using 'while' and 'for' loops; Loop control mechanisms: break, continue, and else clauses, loops (for, while).
Week 6	Using MATLAB's built-in functions for mathematical calculations and data processing (sum, mean, max, min, sort, find).
Week 7	Exploring common mathematical functions like sqrt, log, exp, sin, cos, tan, abs, round, floor, ceil, mod.
Week 8	Creating user-defined functions, input/output arguments, scope of variables.
Week 9	Solving linear and nonlinear equations using solve(), polynomial roots with roots(), and matrix equations using inv() and linsolve().
Week 10	**Mid-Term Exam**
Week 11	Creating 2D plots (plot, bar, pie), customizing plots, adding labels and legends.
Week 12	Introduction to 3D plots: meshgrid, surf, mesh, contour3, and customizing 3D plots.
Week 13	Introduction to symbolic differentiation with diff() and symbolic toolbox for calculating derivatives using syms and diff().
Week 14	Introduction to symbolic integration with integrate() and numerical integration with trapz() and integral().
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Installing MATLAB, Introduction to MATLAB,Example: Execute disp('Hello, MATLAB!') and explore the command window.
Week 2	Variables and Data Types, Example: Perform basic operations: x = 5; y = 10; z = x + y;.
Week 3	Arrays and Matrices, Example: Create a matrix A = [1, 2; 3, 4]; and access elements.
Week 4	Implementing if, elif, and else statements, Writing programs with nested conditions, Using conditional expressions to simplify code
Week 5	Creating programs with 'while' and 'for' loops, Implementing loop control mechanisms like break, continue, and else clauses
Week 6	Operations on Built-in Functions, Example: Use sum(A), mean(A), max(A), min(A), and sort(A).
Week 7	Example: Compute sqrt(16), log(10), exp(2), Operations on Built-in Mathematical Functions sin(pi/4), abs(-5), round(3.7), and mod(10,3).
Week 8	Defining and invoking functions, Passing arguments and returning values, Understanding function scope and lifetime of variables
Week 9	Solving Equations, Example: Solve algebraic equations using solve('2*x + 3 = 7'), find polynomial roots , and solve a system of linear equations using linsolve(A, B).
Week 10	**Mid-Term Exam**
Week 11	Example: Create a 2D plot with plot ,using plotting many functions and use subplot()
Week 12	Example: Create a 3D surface plot with meshgrid and surf(). Plot a 3D contour with contour3() and visualize 3D data points with scatter3().
Week 13	,Example: Use symbolic differentiation with syms x; f = x^2 + 3*x; Differentiation diff(f) to calculate the derivative. Use diff() for numerical differentiation.
Week 14	Integration, Example: Perform symbolic integration with syms x; f = x^2; integral(f, 0, 2) to calculate definite integrals, and use trapz() for numerical integration.
Week 15	Course Review
Week 16	**Final exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**A Guide to MATLAB for Beginners and Experienced Users**	yes
Recommended Texts	**An introduction To Matrix Manipulation In Matlab**	yes
Websites	https://www.mathworks.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
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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

تحليلات عددية

Module Information معلومات المادة الدراسية					
Module Title	Numerical Analysis			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11607				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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	17. **Linear Algebra Techniques**: Master methods for solving systems of linear equations using Gaussian elimination, Gauss-Jordan elimination, and matrix inversion. Understand eigenvalues and eigenvectors. 18. **Numerical Methods for Nonlinear Equations and Integration**: Apply iterative methods (Jacobi's and Gauss-Seidel), interpolation techniques, and various methods for solving nonlinear equations (fixed point, bisection, false position, secant, and Newton-Raphson). Implement numerical integration methods, including the trapezoidal and Simpson's methods. 19. **Numerical Solutions for Ordinary Differential Equations (ODEs)**: Solve initial value problems for first and second-order ODEs using methods such as Euler, modified Euler, Runge-Kutta, predictor-corrector, finite difference, and Runge-Kutta-Nystrom methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- **Problem Solving in Linear Algebra**: Students will be able to effectively solve systems of linear equations using various techniques, including Gaussian elimination and Gauss-Jordan elimination, and compute matrix inverses. 2- **Application of Numerical Methods**: Students will demonstrate proficiency in applying iterative methods (Jacobi's and Gauss-Seidel) and interpolation techniques to solve nonlinear equations and estimate function values. 3- **Numerical Integration and ODE Solutions**: Students will be capable of utilizing numerical integration methods (trapezoidal and Simpson's) and solving ordinary differential equations (first and second order) using techniques such as Euler, Runge-Kutta, and predictor-corrector methods, analyzing their accuracy and stability.

Indicative Contents
المحتويات الإرشادية
	1- **Linear Algebra**
	• Introduction to systems of linear equations
	• Gaussian elimination and Gauss-Jordan elimination
	• Matrix inversion techniques
	• Eigenvalues and eigenvectors
	• Properties of symmetric, skew-symmetric, and orthogonal matrices
	2- **Numerical Methods in Linear Algebra**
	• Iterative methods for solving linear systems
	  ○ Jacobi's method
	  ○ Gauss-Seidel method
	• Interpolation techniques
	  ○ Lagrange interpolation
	  ○ Newton's divided difference
	3- Numerical Solutions of Nonlinear Equations
	• Fixed point iteration
	• Bisection method
	• False position (regula falsi) method
	• Secant method
	• Newton-Raphson method
	4- Numerical Integration
	• Trapezoidal rule

	• Simpson's rule
	• Error analysis in numerical integration
	5- Numerical Solutions of Ordinary Differential Equations (ODEs)
	• Initial value problems for first-order ODEs
	  ○ Taylor series method
	  ○ Euler and modified Euler methods
	  ○ Runge-Kutta methods
	  ○ Predictor-corrector methods
	• Initial value problems for second-order ODEs
	  ○ Finite difference methods
	  ○ Runge-Kutta-Nystrom method
	6- Applications and Case Studies
	• Real-world applications of linear algebra and numerical methods
	• Case studies demonstrate the use of numerical techniques in engineering, physics, and data science

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- **Lectures and Interactive Discussions**: Deliver foundational concepts through lectures, supplemented by discussions to engage students and clarify complex topics. 2- **Hands-On Practice and Computer Simulations**: Provide problem sets for practical application and utilize software tools (e.g., MATLAB, Python) for implementing algorithms and visualizing results. 3- **Collaborative Projects and Case Studies**: Encourage group projects on real-world applications of numerical methods and integrate case studies to enhance relevance. 4- **Quizzes and Support**: Implement regular quizzes for feedback and offer office hours for additional support, allowing students to clarify doubts. 5- **Peer Teaching**: Encourage students to present topics to their peers, reinforcing their understanding and developing communication skills

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	linear algebra: - solution of system linear equations; Gauss and Gauss-Jordon method
Week 2	Matrix inversion by Gauss-Jordan method.
Week 3	Eigenvalue and Eigen vectors
Week 4	Numerical method in linear algebra: - solution of system linear equations; by iteration (Jacobi's and Gauss-Siedel) method;
Week 5	Interpolation.
Week 6	Solution of nonlinear equation: -fixed point, bisection method
Week 7	false position method; secant method
Week 8	Newton-Raphson method
Week 9	Numerical integration: - trapezoidal method; Simpson method
Week 10	Mid -Term Exam
Week 11	Numerical solution of ordinary differential equations (ODE):- initial value problem for first order ODE
Week 12	Tayler's Series least square
Week 13	Euler and modified Euler
Week 14	Runge-Kutta; predictor corrector method; initial value problem for 2'nd order ODE
Week 15	finite difference; Runge-Kutta Nystrom method.
Week 16	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Advanced Engineering Mathematics" by Erwin Kreyszig	Yes
Recommended Texts	"Introduction to Linear Algebra" by Gilbert Strang	No
Websites	https://www.lboro.ac.uk/departments/mlsc/student-resources/helm-workbooks/	

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

نظرية معلومات

Module Information
معلومات المادة الدراسية

Module Title	Information Theory	**Module Delivery**
Module Type	Core	☒ **Theory**
Module Code	ATU11608	☐ **Lecture**
ECTS Credits	5	☐ **Lab**
SWL (hr/sem)	125	☐ **Tutorial** ☐ **Practical** ☐ **Seminar**

Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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- To provide a comprehensive understanding of the fundamental concepts of information theory. 2- To introduce students to the mathematical foundations of information, entropy, and channel capacity. 3- To equip students with the ability to design and analyze source coding and channel coding schemes. 4- To explore the applications of information theory in communication systems and related fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: • Define and calculate entropy, conditional entropy, and mutual information. • Understand and apply Shannon's theorems for source and channel coding. • Analyze the capacity of various communication channels. • Design and implement efficient source coding schemes (Huffman, Shannon-Fano). • Design and analyze linear block codes (Hamming, cyclic codes) for error detection and correction. • Apply the Kraft-McMillan inequality and understand uniquely decodable codes. • Understand and utilize Fano's Inequality. • Understand syndrome decoding. • Understand the applications of information theory.
Indicative Contents المحتويات الإرشادية	1- **Entropy and Mutual Information:** • This covers the fundamental measures of information: entropy (a measure of uncertainty), joint entropy (uncertainty of multiple variables), conditional entropy (uncertainty given another variable), and mutual information (amount of information shared between variables). Students will learn how to calculate these measures and understand their significance in quantifying information. 2- **Channel Capacity and Shannon's Theorems:** • This focuses on the theoretical limits of communication. Students will learn about the concept of channel capacity, which defines the maximum rate at which information can be reliably transmitted over a noisy channel. Shannon's source coding theorem and channel coding theorem will be covered, demonstrating the possibility of achieving these limits. 3- **Source Coding (Data Compression):** • This section deals with techniques for efficiently representing information sources. Students will learn about variable-length coding schemes like Huffman coding and Shannon-Fano coding, and the Kraft-McMillan inequality, which provides criteria for uniquely decodable codes. The goal is to minimize the average number of bits required to represent the source output. 4- **Channel Coding (Error Correction):** • This focuses on techniques for adding redundancy to transmitted data to enable error detection and correction. Students will learn about linear block codes (including Hamming codes and cyclic codes), Hamming distance, and decoding algorithms (especially syndrome decoding). This section emphasizes reliable communication in the presence of noise.

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects /Siminar	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
	Total assessment		100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	General model of communication system.
Week 2	Information Source, Self Information, Entropy, Information Rate, Joint Entropy
Week 3 -4	Conditional Entropy and Mutual Information
Week 5-6	Communication Channel, Discrete Channel, Binary Symmetric Channel (BSC), Ternary Symmetric Channel (TSC), Lossless Channel, Deterministic Channel, Binary Erasure Channel (BEC), Noiseless Channels, Shannon's theorem, Channel Capacity (Discrete channel), Channel capacity of Symmetric channels, Channel capacity of Nonsymmetric channels, Cascading of Channel.
Week 7-8	Source Coding: Source coding of discrete sources, Fixed Length Code, Variable Length Code, Minimum Code Length, Code Efficiency and Redundancy
Week 9	Average Code Length, Requirements for a useful symbol code: Uniquely Decodable, Prefix Code, Kraft-McMillan Inequality.
Week 10	**Mid -Term Exam**
Week 11	Shannon-Fano code, Huffman Code, Huffman vs. Shannon.
Week 12-13	Channel coding: error detecting codes; error correcting codes; systematic and nonsystematic codes; Hamming distance; Hamming bound; Hamming weight; linear block codes; encoding of linear block codes; decoding of linear block codes; cyclic codes; systematic and

	nonsystematic codes; encoding with an (n-k) stage shift register; encoding with a k-stage shift register; syndrome calculation and error detection;
Week 14	Channel Coding: Hamming Codes
Week 15	Channel Coding: Cyclic Codes
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	"Elements of Information Theory" by Thomas M. Cover and Joy A. Thomas	No
Recommended Texts	• "Information Theory, Inference, and Learning Algorithms" by David J.C. MacKay • "A First Course in Information Theory" by Raymond W. Yeung	No
Websites		

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية
معالجة إشارة رقمية

Module Information معلومات المادة الدراسية		
Module Title	**Digital Signal Processing**	**Module Delivery**
Module Type	**C**	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module Code	ATU11609	

ECTS Credits	**6**	☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	**150**		

Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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

68. Understand how to mathematically describe signals and how to perform calculations on signals.
69. Studying the performance of convolution between signals and understanding its impact on the analysis of time invariant linear systems. Understand the idea of impulsive response. Learn to calculate the output of an LTI system given the input and impulse response by torsion sum and torsion integral.
70. Study the calculation of a Fourier series or Fourier transform of a well-defined set of signals from first principles. Furthermore, using the properties of the Fourier transform to compute the Fourier transform (and its inverse) for a broader class of signals.
71. A good understanding of the fundamentals of discrete-time signals and systems
72. Familiarity with techniques of analysis of discrete-time signals and the use of Z-transforms.
73. Knowledge of spectral properties of discrete-time systems through the use of Discrete Fourier transform (FFT) of sequences.
74. Skills in the design of digital filters.

Module Learning Outcomes

مخرجات التعلم للمادة الدراسية

1. Illustrate digital signals, systems and their significance.
2. Analyses the digital signals using various digital transforms DFT, FFT etc.
3. Design and develop the basic digital system.
4. Interpret the finite word length effects on functioning of digital filters.

Indicative Contents
المحتويات الإرشادية

Indicative content includes the following.

Part A - Functions

1. Concept of frequency in continuous time and discrete time signals –Sampling theorem – Discrete time signals. Discrete time systems –Analysis of Linear time invariant systems –Z transform –Convolution and correlation.

2. THE Z-TRANSFORM

3. Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 and Radix-4 FFT algorithms – Decimation in Time – Decimation in Frequency algorithms – Use of FFT algorithms in Linear Filtering and correlation.

4. System Design of Discrete time IIR filter from continuous time filter – IIR filter design by Impulse Invariance. Bilinear transformation – Approximation derivatives – Design of IIR filter in the Frequency domain.

5. Quantization, round off errors and overflow errors. Multi rate digital signal processing: Concepts, design of practical sampling rate converters, Decimators, interpolators. Poly phase decompositions. Application of DSP – Model of Speech Wave Form.

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in presenting this unit is to encourage students to participate in solving exercises, and at the same time improve and expand their critical thinking skills through some group and individual scientific activities and competitions.

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	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	102	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Convolution and correlation
Week 2	Analysis of Linear time invariant systems –Z transform
Week 3	Efficient computation of DFT Properties of DFT – FFT algorithms – Radix-2 and Radix-4 FFT algorithms
Week 4	Decimation in Time – Decimation in Frequency algorithms – Use of FFT algorithms in Linear Filtering and correlation
Week 5	System Design of Discrete time IIR filter from continuous time filter
Week 6	IIR filter design by Impulse Invariance. Bilinear transformation –Design of IIR filter in the Frequency domain
Week 7	Realization of the System Design of Discrete time IIR filter from continuous time filter

Week 8	Realization of the System Design of Discrete time FIR filter from continuous time filter
Week 9	Linear phase filter – Windowing techniques – rectangular, triangular, Blackman and Kaiser windows
Week 10	**Mid Term**
Week 11	Frequency sampling techniques – Structure for FIR systems
Week 12	Quantization, round off errors and overflow errors.
Week 13	Poly phase decompositions. Application of DSP – Model of Speech Wave Form
Weeks 14&15	Multi rate digital signal processing: Concepts, design of practical sampling rate converters, Decimators, interpolators.
Week 16	**Final Exam.**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	.Oppenheim A V and Sehafer R W, "Discrete Time Signal Processing"	No
Recommended Texts	Proakis J G and Manolakis D G, "Digital Signal Processing", Pearson Education India.	No
Websites	https://umdearborn.edu/cecs/departments/electrical-and-computer-engineering/undergraduateprograms/bse-electrical-engineering/program-educational-objectives https://umdearborn.edu/cecs/departments/electrical-and-computer-engineering/undergraduateprograms/bse-electrical-engineering/student-outcomes	

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
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	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

الياف ضوئية

Module Information

معلومات المادة الدراسية					
Module Title	Optical Fiber			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11610				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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	During this course, students will be: 1- Study the basic principle of optical communication and optical fiber and its elements 2- Understand the available analytical methods to evaluate their performance and key design features. 3- Examine and think critically about historical technology solutions in the evolution of optical communication. 4- Understand the design of transceiver in optical communications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course students will be able to: 1- Describe and mathematically analyze optical components used in communication systems. 2- Understand the principles of optical communication system design.

	3- Identify and describe the major sources of noise and signal impairments in an optical communication system.
Indicative Contents المحتويات الإرشادية	1- Principle of optical communication and optical fiber. 2- Degradation in optical fiber 3- Optical transmitters and receiver.

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
		Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	**Overview of Optical fiber:** Introduction, Historical development, general system, advantages & disadvantages, applications of optical fiber communication, and optical fiber waveguides.
Week 2	**Ray theory transmission:** internal reflection, Acceptance angle, Numerical aperture, Skew rays.
Week 3	**Electromagnetic mode theory for optical propagation:** Modes in a planar guide, Phase, group velocity.
Week 4	**Manufacturing:** Manufacture of optical fiber, Modified chemical vapor deposition (MCVD), outside vapor deposition (OVD), Fiber materials.
Week 5	**Cylindrical fiber**: Modes in optical fiber, Mode coupling, Step & Graded index fibers, normalized frequency, plastic and glass OF, propagation of light in OF
Week 6	**Single-mode fibers:** Cutoff wavelength, Mode-field diameter and spot size, Effective refractive index, Group delay and mode delay factor.
Week 7 &8	**Degradation optical fiber:** Attenuation, Material absorption losses in silica glass fibers (Intrinsic & Extrinsic absorption), Linear scattering losses (Rayleigh & Mie scattering), Bending losses, core and cladding losses, Nonlinear scattering losses (Stimulated Brillouin & Stimulated Raman scattering).
Week 9	**Dispersion**: Chromatic dispersion:, material dispersion, waveguide dispersion, polarization mode dispersion, polarization maintaining fiber.
Week 10	**Mid-Term Exam**
Week 11	**Intermodal dispersion:** Multimode step index fiber, Multimode graded index fiber, waveguide dispersion,
Week 12	**Modulation**: Nonlinearity in optical fiber, self-phase modulation, cross-phase modulation, four-wave mixing.
Week 13&14	**Optical sources and transmitters:** transmitter in optical system, Light Emitting Diode, LED power and efficiency, LED structures, LED characteristics, Modulation, Laser diode, principle of working of laser diode, laser diode characteristic. laser diode driver circuit.
Week 15	**Optical Receiver:** Fundamentals, Optical Detectors, Noise Sources in a Receiver, Quantum efficiency, Responsivity, Avalanche photodiodes, Phototransistors.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to optical communication system components (sources, fibers, detectors)
Week 2	Study of light and lasers used in optical communications.
Week 3	Measurement of laser characteristics (wavelength, beam width, stability).
Week 4	Characteristics of Light Emitting Diode (LED) vs. Laser Diode (LD).
Week 5	Basic optical link using LED – Fiber – Photodetector.
Week 6	Experiment: Measurement of attenuation in optical fibers.

Week 7	Effect of wavelength on attenuation.
Week 8	Bending loss in optical fibers.
Week 9	Splicing and connector losses.
Week 10	Fiber testing using OTDR (Optical Time Domain Reflectometer).
Week 11	**Mid-Term Exam**
Week 12	Characteristics of PIN photodiode.
Week 13	Characteristics of Avalanche Photodiode (APD).
Week 14	Digital optical link transmission.
Week 15	Analog optical link transmission.
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1- **Optical Fiber Communication** – Gerd Keiser, 4th Ed., MGH, 2008. 2- **Optical Fiber Communications**– – John M. Senior, Pearson Education. 3rd Impression, 2007.	yes
Recommended Texts	**Fiber optic communication** – Joseph C Palais: 4th Edition, Pearson Education	no
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

مسيطر دقيق

Module Information
معلومات المادة الدراسية

Module Title	Microcontroller	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11611		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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 FPGA Fundamentals and provide students with a comprehensive understanding of FPGA technology, including its definition, historical development, and various applications. 2- To familiarize students with the basic components and structure of FPGAs, including LUTs, flip-flops, registers, multiplexers, CLBs, I/O blocks, and interconnects.

	3- To introduce students to VHDL as a hardware description language, including design flow, EDA tools, and translating VHDL code into circuit implementations. 4- Design Digital Systems by providing practical experience in designing digital systems such as Multiply Accumulate Circuits (MAC), digital filters, and neural networks using VHDL and FPGA. 5- Integrate MATLAB with FPGA to explore the integration of MATLAB with FPGAs for system design and simulation purposes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describe the fundamental concepts of FPGA technology and its applications in various fields. 2. Identify and explain the components of FPGA architecture and their functions. 3- Write basic VHDL code and implement both parallel and sequential VHDL code, including FSMs for digital design. 6. Design and simulate digital circuits such as MAC and digital filters using VHDL on an FPGA platform. 7. Utilize MATLAB for modeling and simulating FPGA designs effectively.
Indicative Contents المحتويات الإرشادية	9. FPGA Overview & architecture 10. Logic circuit application using VHDL 11. FPGA with MATLAB

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation
تقييم المادة الدراسية

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

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Overview of FPGA**: Definition, History, and Applications - FPGA vs ASIC: Differences and use cases - FPGA architecture: Basic Components and Structure - Look-up tables (LUT) - Flip-flops, Registers, and Multiplexers - CLBs (Configurable Logic Blocks) - I/O Blocks and Interconnects
Week 2	About VHDL - Design Flow - EDA Tools - Translation of VHDL Code into a Circuit
Week 3	Fundamental VHDL Units- LIBRARY Declarations- Entity Declaration - Architecture body - Behavioral model
Week 4	VHDL Data Types - VHDL Data Classes
Week 5	VHDL Parallel Code
Week 6	code inside Processes VHDL for Sequential
Week 7	Finite State Machines (FSM)
Week 8	Arithmetic Logic Elements- Logic Implementation Using FPGA
Week 9	Packages and Components
Week 10	**Mid-Term Exam**
Week 11	Function and Procedure
Week 12	System Design Multiply Accumulate Circuits (MAC)
Week 13	Design of Digital Filters
Week 14	System Design of Neural Network
Week 15	FPGA with MATLAB
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	An introduction to the FPGA board - Vivado IDE
Week 2	VHDL code for Shift Register
Week 3	VHDL code for Multiplexer
Week 4	VHDL code for a counter
Week 5	VHDL code for SSD counter
Week 6	VHDL code for Full Adder
Week 7	VHDL code for Traffic Light Controller
Week 8	VHDL code for ALU
Week 9	VHDL code for Function and Procedure
Week 10	**Mid-Term Exam**
Week 11	VHDL code for MAC
Week 12	VHDL code for FIR Filter
Week 13	VHDL code for LPF Filter
Week 14	VHDL code for NN
Week 15	MATLAB to FPGA
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Volnei A. Pedroni, "Circuit design with VHDL", MIT Press, 2004.	yes
Recommended Texts	Stephan Brown and Zvonko Vranesic , "Fundamentals of Digital Logic with VHDL Design", McGraw-Hill, 2000	no
Websites	https://nandland.com/fpga-101/	

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

برمجة بلغة بايثون

Module Information معلومات المادة الدراسية					
Module Title	Python Language Programing			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11612				
ECTS Credits	**3**				
SWL (hr/sem)	75				
Module Level	UGx1		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		

Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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	20. To define the fundamental concepts of Python programming. 21. To introduce the principles of coding 22. To learn problem-solving using Python. 23. To learn various programming techniques and structures in Python.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	17. Understand the fundamental concepts, syntax of Python, write and execute scripts Python. 18. Utilize variables, data types & operators, loops and conditional statements. 19. Define and use functions to create modular code. 20. Work with data structures like lists, tuples, dictionaries, and sets. 21. Handle files and perform basic input/output operations.
Indicative Contents المحتويات الإرشادية	12. Syntax of Python 13. Loops and conditional statements 14. Data structures 15. Input / Output operations.

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 coding exercises, while at the same time refining and expanding their problem-solving and critical thinking skills. This will be achieved through interactive lectures, hands-on coding tutorials, and engaging programming tasks that involve real-world applications and challenges relevant to the students.

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	
Unstructured SWL (h/sem)	12	**Unstructured SWL (h/w)**	

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Python and Computer Programming; Python as a programming tool; Different Python versions; Setting up the Python environment
Week 2	Data Types and Variables; Writing your first Python program; Understanding literals and variables; Basic input and output operations
Week 3	Basic Operators; Arithmetic, comparison, and logical operators; Operator precedence and associativity
Week 4	Conditional Execution; Implementing conditional statements; Nested conditions and conditional expressions
Week 5	Loops; Understanding and using 'while' and 'for' loops; Loop control mechanisms: break, continue, and else clauses
Week 6	Lists and List Processing; Creating and modifying lists; List operations and methods; Sorting algorithms, including bubble sort
Week 7	Logical and Bitwise Operations; Boolean logic in Python; Bitwise operators and their applications
Week 8	Functions; Defining and invoking functions; Function parameters, arguments, and return values; Scope and lifetime of variables
Week 9	Tuples and Dictionaries; Creating and using tuples; Understanding dictionaries and their methods
Week 10	**Mid-Term Exam**
Week 11	Exception Handling; Understanding errors and exceptions; Try-except blocks; Handling multiple exceptions and using 'finally'
Week 12	Modules and Packages; Importing and using modules; Exploring Python packages; Standard libraries and third-party modules
Week 13	String and List Methods; String operations and methods; Advanced list methods and comprehensions
Week 14	Course Review; Comprehensive review of all topics; Hands-on project to apply learned concepts; Preparation for PCEP and PCAP certifications
Week 15	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Installing Python, Exploring Python versions, Writing and running a basic Python program
Week 2	Declaring and using different data types (int, float, string), Understanding literals and variables, Implementing basic input and output operations
Week 3	Writing programs that use arithmetic, comparison, and logical operators, Understanding operator precedence and associativity
Week 4	Implementing if, elif, and else statements, Writing programs with nested conditions, Using conditional expressions to simplify code
Week 5	Creating programs with 'while' and 'for' loops, Implementing loop control mechanisms like break, continue, and else clauses
Week 6	Writing programs that create and modify lists, Using list operations and methods, Implementing sorting algorithms like bubble sort
Week 7	Writing programs that use Boolean logic, Implementing bitwise operators for efficient data manipulation
Week 8	Defining and invoking functions, Passing arguments and returning values, Understanding function scope and lifetime of variables
Week 9	Writing programs to create and use tuples, Implementing dictionaries and utilizing their methods for efficient data storage and retrieval
Week 10	**Mid-Term Exam**
Week 11	Writing programs that use try-except blocks, Handling multiple exceptions, Using 'finally' for clean-up operations
Week 12	Creating and importing custom modules, Exploring Python packages, Using standard and third-party libraries in programs
Week 13	Implementing string manipulation and advanced list operations, Writing programs using string methods, List comprehensions for efficient data processing
Week 14	Developing a comprehensive project that incorporates all course topics, Applying learned concepts to build a functional Python application, Preparing for PCEP and PCAP certification exam scenarios
Week 15	Course Review
Week 16	**Final exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**"Python Crash Course" by Eric Matthes**	yes
Recommended Texts	**"Automate the Boring Stuff with Python" by Al Sweigart**	no
Websites	https://realpython.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

شبكات الحاسبات

Module Information معلومات المادة الدراسية					
Module Title	**Computer Networks**			**Module Delivery**	
Module Type	**C**			☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	ATU11701				
ECTS Credits	**7**				
SWL (hr/sem)	**175**				
Module Level	UGx11		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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	24. To introduce the basic concepts related computer networks. 25. To overview the layers of the most common models of computer networks. 26. To present the main concerns of the Physical Layer of the OSI reference model. 27. To detail Ethernet and Wi-Fi as two of the most important Data-link Layer protocols. 28. To cover the details regarding IPv4 as the most important Network Layer protocol. 29. To illustrate in details TCP and UDP as the most common Transport Layer protocols. 30. To give brief description about the most common services, protocols and applications of the Application Layer.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize the basic components of computer networks. 2. List the main functions and responsibilities of each layer of OSI reference model and TCP/IP model. 3. Discuss Ethernet and WiFi protocols as well as their MAC mechanisms. 4. Explain IPv4 and describe fragmentation and routing of the Network Layer. 5. Detail and specify addressing and subnetting scenarios of IPV4. 6. Present the main protocols, functions and services of the Transport Layer. 7. List the main functions and protocols of the Application Layer. 8. Design, install, manage and maintain wired and wireless LANs.
Indicative Contents المحتويات الإرشادية	1. Basic Concepts and networking models [8 hrs] 2. Physical Layer. [4 hrs] 3. Data-link Layer. [8 hrs] 4. Network Layer. [28 hrs] 5. Transport Layer. [8 hrs] 6. Application Layer. [4 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	82	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	

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, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction/ Categories, Protocols, Switching, Transmission modes, Transfer Rates
Week 2	Networking Models/ OSI reference model , TCP/IP model
Week 3	Physical Layer/ Mediums, Topologies, Noise, Losses , Timing, Coding, repeaters, hubs
Week 4	Data-link layer/ Ethernet: Evolution and Standards, format , CRC, CSMA/CD, bridges, switches
Week 5	Data-link layer/ WiFi: Evolution and Standards, Signaling, Link budget, Format, CSMA/CA, DCF , PCF, access points
Week 6	Network Layer/ IPv4: Format, Fragmentation, Routing, routers
Week 7	Network Layer/ Ipv4: Classful Addressing
Week 8	Network Layer/ IPv4: Classless Addressing
Week 9	Network Layer/ NAT, ICMP, ARP
Week 10	**Mid-Term Exam**
Week 11	Network Layer/ IPv6 : Format, Extension Headers, Addressing, Tunneling
Week 12	Network layer/ Introduction to Routing protocols: RIP, OSPF
Week 13	Transport layer/ UDP: Format, Services, Applications; TCP: Format, Services, Applications
Week 14	Transport Layer/TCP: Flow Control, Error Control, Connection Establishment, Connection Termination
Week 15	Application Layer/ E-Mail (SMTP, POP3), File Transferring (FTP), DNS , Web (HTTP, HTML)
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Cabling
Week 2	Ethernet LANs
Week 3	WLANs
Week 4	Sharing resources in Windows Oss
Week 5	Cisco Packet Tracer, CLI of Cisco IOS
Week 6	Physical Layer Devices, Data Link Layer Devices, Network Layer Devices
Week 7	Subnetting (FLSM)
Week 8	Subnetting (VLSM)
Week 9	IPv6
Week 10	**Mid-Term Exam**
Week 11	Routing (static)
Week 12	Routing (dynamic)
Week 13	VLANs
Week 14	DHCP
Week 15	DNS
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	***Data Communications and Networking***, Behrouz A. Forouzan, 5th Edition, McGraw-Hill	No
Recommended Texts	***TCP/IP Protocol Suite,*** Behrouz A. Forouzan, 4th Edition, McGraw-Hill	No
Websites	https://cnj.atu.edu.iq/wp-content/uploads/2023/06/YouTubelinks-laith-wajeeh.pdf	

Grading Scheme

مخطط الدرجات

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

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

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

اتصالات لاسلكية

Module Information معلومات المادة الدراسية					
Module Title	Wireless Communications			**Module Delivery**	
Module Type	**C**			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	**ATU11702**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	UGx11		**Semester of Delivery**	1	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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	• To provide students with a foundational understanding of wireless communication systems and their challenges. • To introduce the characteristics of wireless channels, including path loss, shadowing, and multipath fading. • To familiarize students with modulation techniques and multiple access schemes used in wireless communications. • To provide an overview of emerging wireless technologies and applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this course, students will be able to: • Explain the fundamental principles of wireless communication systems. • Analyze and model wireless channel characteristics, including path loss, shadowing, and multipath fading. • Understand and apply various modulation and multiple access techniques used in wireless communications. • Describe the architecture and operation of wireless sensor networks. • Explain the principles of the Global Positioning System (GPS). • Discuss emerging wireless technologies and their applications. • Understand the challenges of wireless communications. • Understand the frequency spectrum and regulatory issues.
Indicative Contents المحتويات الإرشادية	**Indicative Contents (by Week):** • **Week 1:** Introduction to wireless communication systems, applications, challenges, and frequency spectrum. • **Weeks 2-3:** Wireless channel characteristics: path loss models, shadowing, measurements, and link budget analysis. • **Weeks 4-5:** Wireless channel characteristics: multipath propagation, small-scale fading (Rayleigh, Ricean), Doppler spread, and coherence time. • **Week 6:** Multiple Access Techniques (TDMA/FDMA/CDMA/SDMA). • **Week 7:** Diversity techniques: concepts, time, frequency, and space diversity, selection combining, and maximal ratio combining. • **Week 8:** Mid-term exam. • **Weeks 9-11:** Cellular networks: cellular network principles, cell splitting, sectoring, frequency reuse, and handoff, coverage, interference. • **Weeks 12-14:** Wireless sensor networks: introduction, architecture, and energy efficiency. • **Weeks 15:** Emerging wireless technologies and applications: Internet of Things (IoT), wireless sensor networks, millimeter-wave communications, and visible light communication (VLC).

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to Wireless Communications** • Overview of wireless communication systems.

	• Applications and evolution of wireless technologies. • Challenges of wireless communications. • Frequency spectrum and regulatory issues.
Week 2-3	**Wireless Channel Characteristics: Path Loss and Shadowing** • Path loss models (free-space, two-ray). • Shadowing/log-normal fading. • Path loss and shadowing measurements. • Link budget analysis.
Week 4-5	**Wireless Channel Characteristics: Multipath Fading** • Multipath propagation and its effects. • Small-scale fading (Rayleigh, Ricean). • Doppler spread and coherence time.
Week 6	**Multiple Access Techniques** • Time / Frequency / Code division multiple access (TDMA, FDMA, CDMA). • Space division multiple access (SDMA).
Week 7	**Modulation Techniques for Wireless Channels** • Review of digital modulation (ASK, FSK, PSK, QAM). • Modulation techniques for fading channels (OFDM). • Performance analysis in fading channels.
Week 8	**Mid -Term Exam**
Week 9-11	**Cellular Networks** • Cellular network principles. • Cell splitting, sectoring, frequency reuse. • Handoff and mobility management. • Co-channel interference and S/I ratio. • Coverage and Capacity in Cellular Systems.
Week 12	**Introduction to Wireless Sensor Networks** • Definition and characteristics of WSN. • Applications of WSN (Healthcare, Military, Smart Cities, IoT, etc.) • Comparison with other wireless networks.
Week 13	**WSN Architectures** • Sensor node architecture (Hardware and Software components). • Network topologies (Star, Mesh, Cluster-based). • Communication stack for WSN (MAC, Network, Transport layers).

Week 14	**Energy Efficiency in WSN** • Energy consumption sources in sensor nodes. • Energy-efficient communication protocols. • Duty-cycling and sleep scheduling.
Week 15	**Emerging Wireless Technologies and Applications** • Internet of Things (IoT) and wireless sensor networks. • Millimeter-wave communications. • Visible light communication (VLC).
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	"Wireless Communications" by Andrea Goldsmith	No
	Gary S. Rogers and John S. Edwards, "An Introduction to Wireless Technology", 1st Edition. ISBN-13: 978-0130949868.	Yes
	Simon O. Haykin and Michael Moher, "Modern Wireless Communications", 1st Edition. ISBN-13: 978-0130224729.	Yes
	X. Wang and H. Vincent Poor "Wireless communication systems: Advanced techniques for signal reception, ISBN-13: 978-0130214355.	Yes
Recommended Texts	"Wireless Communications: Principles and Practice" by Theodore S. Rappaport.	No
	"Fundamentals of Wireless Communication" by David Tse and Pramod Viswanath.	No
	Andreas F. Molisch," Wireless communications: from fundamentals to beyond 5G", ISBN-13: 978-1119117209.	NO
	H. Kim, "Wireless Communications Systems Design" 1st Edition, ISBN-13978-1118610152.	No
Websites	https://www.elprocus.com/wireless-communication-seminar-topics/	

Grading Scheme
مخطط الدرجات

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

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

اتصالات ضوئية

Module Information

معلومات المادة الدراسية

Module Title	Optical Communication		**Module Delivery**
Module Type	**C**		☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	ATU11703		
ECTS Credits	**6**		
SWL (hr/sem)	**150**		
Module Level	UGx11	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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	During this course, students will study the major elements of optical communication systems and analytical methods to evaluate their performance and key design features. Students will examine and think critically about historical technology solutions in the evolution of optical communication systems.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course students will be able to: 4- Be conversant in the major application areas for optical communication systems. 5- Analytically evaluate the performance and technical merits of an optical communication system. 6- Analyze and design an optical communication system.
Indicative Contents المحتويات الإرشادية	4- Optical communication system. 5- Multi-channel systems. 6- Optical Networks.

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1,2	Optical transmitter system: Optical modulator, intensity modulator/ direct detection, Optical Receiver system Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers.
Week 3,4	Optical receiver system (detectors): Introduction, Optical Receiver Operation, receiver sensitivity, quantum limit, eye diagrams, coherent detection, burst mode receiver operation, Analog receivers.
Week 5	**Optical fiber connection:** joints, couplers and isolators.
Week 6	Optical repeaters.
Week 7	**Multichannel system**: WDM system: Components, multiplexers/demultiplexers, add/drop (de)multiplexers, spectral efficiency, crosstalk.
Week 8,9	Time -division multiplexing (TDM) Code-division multiplexing (CDM) Dence-wavelength division multiplexing (DWDM)
Week 10	Mid-Term Exam
Week 11,12	Optical amplifiers: basic applications and types, Semiconductor optical amplifiers, Fiber and waveguide amplifiers, Wavelength conversion, Optical regeneration, EDFA.
Week 13,14	Optical networks: Introduction, Basic concepts, Introduction, SONET / SDH, Optical Interfaces, SONET/SDH rings, High – speed light – waveguides.
Week 15	Optical network transmission modes, layers and protocols, Wavelength routing networks, Optical switching networks, Optical Ethernet, Network protection and survivability

Week 16	Final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Effect of bandwidth on signal quality.
Week 2	Noise analysis in optical receivers.
Week 3	Temporal response of optical receivers.
Week 4	Dispersion in optical fibers. Experiment: Experiment:
Week 5	Mode study in multimode fibers.
Week 6	Effect of dispersion on data transmission rate.
Week 7	Amplitude Modulation (AM) in optical communication.
Week 8	Frequency Modulation (FM) using optical link.
Week 9	Digital modulation – On-Off Keying (OOK).
Week 10	**Mid-Term Exam**
Week 11	Optical interference using interferometer.
Week 12	Optical filters and their applications in communication.
Week 13	WDM (Wavelength Division Multiplexing) techniques. DWDM (Dense Wavelength Division Multiplexing) techniques.
Week 14	Simulation of optical systems using OptiSystem / MATLAB.
Week 15	Design and testing of a small optical communication link (transmitter–fiber–receiver) with performance analysis.
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	3- Optical Fiber Communication – Gerd Keiser, 4th Ed., MGH, 2008. 4- Optical Fiber Communications– – John M. Senior, Pearson Education. 3rd Impression, 2007.	yes

Recommended Texts	1- Fiber optic communication – Joseph C Palais: 4th Edition, Pearson Education. 2- Agrawal, G.: Fiber-Optic Communication Systems, 4th Ed., Wiley 2010	no
Websites		

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

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

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

سيطرة

Module Information معلومات المادة الدراسية		
Module Title	Control	**Module Delivery**
Module Type	**B**	☒ Theory ☐ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	ATU11704	
ECTS Credits	**7**	
SWL (hr/sem)	**175**	

Module Level		UGx11	**Semester of Delivery**		1
Administering Department		COMM.	**College**		NTEC
Module Leader	Ahmad T Abdulsadda		**e-mail**	Coj.abdulsad@atu.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor			**e-mail**		
Peer Reviewer Name		Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date		01/05/2025	**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	50. To provide an introduction to the classical control systems. 51. To developing mathematical models to design electromechanical systems using transfer function root locus and frequency response design techniques. 52. In additive, analysis and implementation of digital control system.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	75. Designing engineering 76. Modelling engineering 77. Simulator skills
Indicative Contents المحتويات الإرشادية	Indicative content includes the following.

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	82	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	93	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
		Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction**

	Introduction to control system - Definitions - Historical background - Mathematical background - General natural of engineering control problem - Basic elements of control system - Type of control system - Closed loop - Open loop - Time variant - Time invariant system - linear & non-linear system.
Week 2	**Mathematical model of dynamic system** Mathematical model of writing differential equation - Electrical circuit components - Resistance - Capacitance - Inductance - Analogy of electrical system
Week 3	Mathematical model of mechanical system - Translation system - Mass - Spring - Dashpot - Rotational system - Analogy of mechanical system- Transfer function - How to determine the transfer function - Advantage - Disadvantage - Properties of transfer function - Multivariable of transfer function.
Week 4	**Block diagram** Definition of basic block elements - Procedure of drawing lock diagram - Block diagram reduction algebra - Mason's formula
Week 5	**Time response analysis** Transient and steady-state region of response - Standard test signals - How to determine order of system from transfer - First order system - Second order system - Time response specification - Example of first order and second order - Higher order system response.
Week 6	**Steady-state error response** Type of control system - How to determine order from transfer function - Position velocity and acceleration error constant - Method of dynamic error constant.
Week 7	**System stability** Routh-Hurwitz criteria - Poles and zeros definition - Relation between system parameter and poles location.
Week 8	**a- Root-locus analysis.**
Week 9	**b- Root-locus analysis.**
Week 10	**Frequency response analysis** Advantage and disadvantage of frequency analysis - Time concept of frequency response - Plotting of frequency response - Frequency response specification
Week 11	Phase margin - Gain margin - Bode plot phase margin and gain margin of bode plot.
Week 12	**Nyquist stability analysis**
Week 13	**Design of control system** Design of control system from frequency response - Lead compensator - lag compensator - lead-lag compensator.
Week 14	**Tunable PID controllers**
Week 15	**Linear versus nonlinear systems**
Week 16	**Final Exam.**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: MATLAB overview: Laplace and Laplace Inverse function- Polynomial Representations- Transfer function- electrical control systems.
Week 2	Lab 2: Continuous Time ZPK model in MATLAB.
Week 3	Lab 3: Paritial Fraction model in MATLAB.
Week 4	Lab 4: Block Diagram models: open loop- closed loop- feed back connection- series- parallel.
Week 5	Lab 5: Modeling control system using Simulink- system response characteristics.
Week 6	Lab 6: Frequency domain response: data, plot and characteristics.
Week 7	Lab 7: Root locus and Routh-Hurwits.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Feedback Control Systems by philips and Harbor (3rd Edition). Digital Control and State variable methods: Conventional and Intelligent control systems, by M.Gopal, Tata McGraw Hill, 3rd Ed., 2009.	Yes
Recommended Texts	Modern Control System by Richard C. Dorf (5th Edition). Control Sytem Design using MATLAB by Bahram Shahian & Michael Hassul. User's Guide for The Student Edition of MATLAB by Duane Hanselman & Bruce Littlefield. H. K. Khalil, 'Nonlinear Systems', Prentice Hall, 3rd Ed., 2002. S.Sastry, 'Nonlinear Systems: Analysis, Stability and Control', Springer, 1999.	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

إدارة مشاريع

Module Information

معلومات المادة الدراسية

Module Title	Projects Management		**Module Delivery**
Module Type	**B**		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	**ATU11705**		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	UGx1	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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- **Project Foundations**: Understand the project management life cycle, initiate projects effectively, and select suitable projects using decision-making tools. 2- **Planning and Proposals**: Develop comprehensive project proposals, define scope and responsibilities, and create a Work Breakdown Structure (WBS) for detailed planning. 3- **Execution and Control**: Implement scheduling, resource assignment, budgeting techniques, and risk management strategies to ensure project success. 4- **Leadership and Communication**: Enhance team engagement through effective leadership, ethical practices, and robust communication and documentation methods.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- **Project Feasibility and Alignment**: Apply project selection methods to evaluate project feasibility and assess contributions to business strategy and goals. 2- **Stakeholder Collaboration**: Work closely with stakeholders to determine and document project goals, performance requirements, and deliverables. 3- **Project Management Practices**: Select and implement appropriate project management practices, tools, and methodologies tailored to project needs. 4- **Requirements and Constraints**: Define, analyze, and document project requirements, assumptions, constraints, and performance criteria for quality assurance. 5- **Planning and Estimation**: Develop a comprehensive project plan, including schedule, budget, resources, and a Work Breakdown Structure (WBS), while refining time and cost estimates. 6- **Progress Management**: Manage project progress through performance reporting and analysis, ensuring activities are executed as planned, and communicate updates to stakeholders. 7- **Risk Management**: Identify, assess, and respond to project risks and issues, implementing corrective actions as necessary. 8- **Closure and Documentation**: Facilitate project closure by obtaining final acceptance of deliverables, documenting lessons learned, preserving essential records, and ensuring compliance with legal requirements.
Indicative Contents المحتويات الإرشادية	**1. Introduction to Project Management** • Overview of project management principles • Importance of the project life cycle **2. Project Selection and Initiation** • Methods for project selection • Evaluating project feasibility • Aligning projects with business strategy **3. Stakeholder Engagement** • Identifying and analyzing stakeholders • Techniques for effective communication and collaboration **4. Project Planning**

	• Defining project goals and performance requirements • Documenting deliverables and project scope • Selecting project management methodologies and tools **5. Requirements and Constraints** • Defining and refining project requirements • Identifying assumptions and constraints **6. Scheduling and Budgeting** • Developing project schedules and budgets • Creating a Work Breakdown Structure (WBS) • Time and cost estimation techniques **7. Project Execution and Monitoring** • Managing project progress and performance • Applying performance reporting and analysis techniques • Communicating progress to stakeholders **8. Risk Management** • Identifying and assessing project risks • Developing risk response strategies • Monitoring risk events and issues **9. Team Management** • Selecting, leading, and managing project teams • Conflict resolution and team dynamics **10. Project Closure** • Final acceptance of deliverables • Documenting lessons learned • Administrative and financial closure procedures • Preserving project records for compliance **11. Ethical Considerations in Project Management** • Understanding ethical responsibilities • Promoting integrity and ethical practices in projects **12. Types of Project Organizations** • Exploring different organizational structures • Impacts on project management effectiveness

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1- **Clear Goals and Planning**: Establish SMART goals and develop comprehensive project plans that outline scope, schedule, budget, and risk management. 2- **Stakeholder Engagement and Communication**: Actively involve stakeholders and maintain open communication channels to ensure transparency and alignment throughout the project. 3- **Proactive Risk Management**: Identify and assess potential risks early, implementing mitigation strategies to minimize impact on project outcomes. 4- **Performance Monitoring**: Use metrics and reporting tools to track progress, make adjustments as needed, and ensure deliverables meet quality standards.

	5- **Team Development and Continuous Improvement**: Invest in team building and foster a culture of continuous improvement through regular reviews and knowledge sharing.

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Course Introduction; Project Management Life cycle and processes; Initiating the Project
Week 2	Identifying and selecting projects (Decision Making)
Week 3	Developing Project Proposals; Proposed Solutions (Bid/No-Bid Decisions; Proposals)
Week 4	Techniques for planning a project; Defining Scope, Quality, Responsibility, and Activity Sequence; Create a Work Breakdown Structure
Week 5	The Project Manager (MBTI, VIA Strengths) Business Case for a Positive Workplace; Engagement
Week 6	Techniques for scheduling a project; Developing the Schedule
Week 7	Techniques for resource assignments to a project: Resource Utilization

Week 8	Techniques for budgeting a Project; Determining costs, budget, and Earned Value
Week 9	Techniques for assessing and managing project risks; Developing a risk matrix
Week 10	**Mid -Term Exam**
Week 11	Techniques for Controlling a project; Project performance measurement; Cost Control; Closing the project
Week 12	The Project Manager (Ethics)
Week 13	The Project Team (Leading vs. Managing; Conflict)
Week 14	Project Communication & Documentation
Week 15	Types of Project Organizations
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	*Project Management*, Harold Kerzner, Wiley Publishing, 2013, 11th Edition, ISBN 9781118022276	Yes
Recommended Texts		No
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية
اخلاقيات المهنة

Module Information
معلومات المادة الدراسية

Module Title	اخلاقيات المهنة		**Module Delivery**
Module Type	S		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	ATU11706		
ECTS Credits	2		
SWL (hr/sem)	50		
Module Level	UGx11	**Semester of Delivery**	1
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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. To introduce the students to the basic elements of ethics. 2. To cover the principles of ethics, the philosophy of ethical concepts, the ethical decision-making models, and relevant case studies. 3- To introduce the basics concepts of research ethics. 4- To review the students of the university education ethics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. An understanding of the principles of ethics in applied professional situations. 2. An understanding of the research ethics. 3. An understanding of the university education ethics
Indicative Contents المحتويات الإرشادية	1. مفاهيم اخلاقيات المهنة. 2. أسباب عدم الالتزام بأخلاقيات المهنة. 3. أهم خصائص الاحتراف المهني. 4. اخلاقيات البحث العلمي. 5. اخلاقيات الطالب الجامعي.

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم	
Strategies	1- Lectures. 2- Group discussion and presentation. 3- Case studies. 4- Collaborative learning. 5- Teamwork.

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	أهمية أخلاقيات المهنة
Week 2	المفاهيم الاساسية في اخلاقيات المهنة
Week 3	القيم الاخلاقية للمهنة والمبادئ المشتقة منها
Week 4	الخصائص الخلقية الواجب توافرها في الفرد
Week 5	الاطار العام لتقيم اخلاقيات المهنة
Week 6	المبادئ التي تبعد الممارسات المهنية غير المقبولة و أسباب عدم الالتزام بأخلاقيات المهنة.
Week 7	أهم خصائص الاحتراف المهني : أهمية أخلاقيات المهنة للموظفين; أهمية الاخلاقيات المهنية للمجتمع ; أهمية الاخلاقيات المهنية للمؤسسات المهنية.
Week 8	أخلاقيات المهنة في العمل المهني من النّاحية الادارية والمهنيّة وفق الاطر الوظيفية والعائلية والمجتمعية

Week 9	اخلاقيات البحث العلمي : اخلاقيات المقدمة واهمية البحث ; شروط صياغة العنوان ; فرضيات البحث ; مراحل كتابة البحث.
Week 10	**Mid -Term Exam**
Week 11	كيفية وضع مقترح أو الية العمل الاخلاقي ومن اي مصدر ينبثق في مؤسسة أو شركة إذا كنت مسؤول (مع المسؤول/ مع الزمالاء / مع الزبائن)
Week 12	اخلاقيات الطالب الجامعي
Week 13	انماط الطالب الجامعي
Week 14	مشاكل الطالب في المرحلة الجامعية, واجبات الطالب الجامعي في الحياة الاكاديمية وغير الاكاديمية
Week 15	ترشيد الممارسات الاخلاقية للطلبة الشباب في الفضاءات الرقمية
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts		No
Websites		

Grading Scheme
مخطط الدرجات

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

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

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

ذكاء صناعي

Module Information
معلومات المادة الدراسية

Module Title	Artificial Intelligence			**Module Delivery**	
Module Type	C			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11807				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGx11		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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	In general, the Artificial Intelligence course aims to prepare a generation of professionals capable of contributing to the development and deployment of this transformative technology in a responsible and effective manner. 31. Understand the basic concepts of artificial intelligence. 32. Learn basic algorithms and techniques. 33. Develop programming and application skills. 34. Critical thinking and problem-solving. 35. Apply artificial intelligence in diverse fields.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1 Analyze complex problems and determine the appropriateness of using AI techniques to solve them. 2 Select the appropriate algorithm and approach to design an AI system for a specific problem.

	3 Evaluate the performance of AI and machine learning models using appropriate evaluation metrics. 4 Apply critical thinking in analyzing research papers and articles related to AI. 5 Identify the potential limitations and risks of AI systems in different contexts.
Indicative Contents المحتويات الإرشادية	- Definition of Artificial Intelligence - Types of Artificial Intelligence - Areas of AI Applications - Challenges and Ethics in AI - Overview of Tools and Languages Used

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Supervised Learning, Linear Regression
Week 2	LMS Algorithm, The Normal Equations, Matrix Derivatives, Least Squares
Week 3	Classification: Logistic Regression, Perceptron Learning Algorithm, Multi-class Classification
Week 4	Generative Learning Algorithms: Gaussian Discriminant Analysis, Naive Bayes
Week 5	Generative Learning Algorithms: Naive Bayes
Week 6	Kernel Methods, Feature Maps, LMS with Kernel Trick, Properties of Kernels
Week 7	Support Vector Machines: Margins, Optimal Margin Classifier
Week 8	Deep Learning: Neural Networks, Backpropagation, Vectorization
Week 9	Generalization: Bias-Variance Tradeoff
Week 10	**Mid-Term Exam**
Week 11	Regularization and Model Selection: Cross Validation, Bayesian Regularization
Week 12	Unsupervised Learning: Clustering, K-Means Algorithm, EM Algorithms
Week 13	Principal Component Analysis, Independent Component Analysis
Week 14	Reinforcement Learning: Markov Decision Processes, Value Iteration, Policy Iteration
Week 15	Regularization and Model Selection: Cross Validation, Bayesian Regularization
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Implement Linear Regression using the Gradient Descent method Solve for the optimal parameters using the Normal Equation Visualize the linear regression results on a dataset Compare the performance of Gradient Descent vs. Normal Equation
Week 2	Implement the LMS algorithm to solve linear regression problems Use matrix operations to compute derivatives Analyze the performance of LMS algorithm on different datasets
Week 3	Implement the Normal Equation to solve linear regression Compare results of LMS vs. Normal Equation in terms of accuracy and computational efficiency
Week 4	Implement logistic regression for binary classification Train the model on a classification dataset (e.g. Evaluate the model performance using accuracy

Week 5	Implement the Perceptron algorithm for binary classification Extend the algorithm to solve multi-class classification problems Visualize the decision boundary of the classifier
Week 6	Implement Gaussian Discriminant Analysis (GDA) on a simple dataset Compare GDA with logistic regression for classification performance
Week 7	Implement Naive Bayes classification for a dataset with both continuous and categorical features Evaluate the performance of Naive Bayes against other classifiers
Week 8	Implement kernel methods for feature transformation Apply the LMS algorithm with kernel trick on non-linear datasets Visualize the effect of kernels on the data
Week 9	Implement the SVM with a linear kernel Experiment with different SVM models and kernels Visualize the margins and support vectors on a 2D dataset
Week 10	**Mid-Term Exam**
Week 11	Implement a neural network from scratch Train a neural network on a simple dataset Visualize the training process and the learned weights
Week 12	Implement vectorized neural networks using NumPy Compare the performance of vectorized vs. non-vectorized implementations
Week 13	Implement and visualize Principal Components Analysis
Week 14	Visualize bias-variance tradeoff through learning curves
Week 15	Experiment with regularization techniques to combat overfitting
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**"Pattern Recognition and Machine Learning"** by Christopher M. Bishop	yes
Recommended Texts	**"Machine Learning: A Probabilistic Perspective"** by Kevin P. Murphy	no
Websites	Coursera - Machine Learning by Andrew Ng	

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

الامن السبراني

Module Information

معلومات المادة الدراسية

Module Title	**Cyber Security**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	ATU11809		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		
Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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	53. To develop problem solving skills and understanding of cyber and security theory through the application of techniques. 54. To understand play fair, Hill, AES, and DES algorithms. 55. This course deals with the basic concept of Cyber system. 56. This is the basic subject for all security algorithm. 57. Rail fence and double Coolum transposition
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The students will be able dealing with how does with cyber system , all types of algorithms of cipher system.
Indicative Contents المحتويات الإرشادية	Need some more information about mathematical Modula

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

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

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	52	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem)	**100**		

الحمل الدراسي الكلي للطالب خلال الفصل	

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction to communication cyber :** security trends; security attacks; security mechanisms.
Week 2	**Classical encryption techniques:** symmetric cipher model; substitution techniques (Caesar cipher, monoalphabetic cipher; Playfair cipher, Hill cipher, polyalphabetic ciphers, and one-time pad); transposition techniques (rail fence technique, columnar technique, double columnar technique).
Week 3	**Block cipher and data encryption standard (DES):** Block cipher principles (Feistel cipher, Feistel cipher structure, Feistel decryption algorithm); DES encryption; DES decryption; differential and linear cryptanalysis; block cipher design principles
Week 4	**Advanced encryption standard (AES):** substitution bytes transformation;; MixColumns transformation;
Week 5	ShiftRow transformation
Week 6	AddRoundKey transformation;
Week 7	Mid-term Exam
Week 8	Equivalent inverse cipher
Week 9	**Multiple encryption:** double DES; triple DES with two keys; triple DES with three keys.
Week 10	electronic codebook mode
Week 11	**Security applications on computer networks:** E-mail security; IP security; web security.
Week 12	**Digital signatures and authentication protocols:** digital signatures; digital signature standard; authentication protocoles
Week 13	**Block cipher modes of operation:** electronic codebook mode; cipher block chaining mode; cipher feedback mode; output feedback mode; counter mode.

Week 14	**Stream ciphers and RC4**: stream cipher structure; RC4 algorithm
Week 15	**Public-key cryptography:** Public-key cryptosystem; Public-key cryptanalysis.
Week 16	**RSA algorithm:** description of the algorithm; computational aspects; RSA security.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	➢ William Stalling, "Cryptography & Network Security," latest edition	Yes
Recommended Texts	➢ Bruce Schenier, "Applied Cryptography" latest edition	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

اتصالات الأقمار الصناعية

Module Information

معلومات المادة الدراسية				
Module Title	**Satellite Communication**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	ATU11808			
ECTS Credits	4			
SWL (hr/sem)	**100**			
Module Level	UGx11	**Semester of Delivery**	2	
Administering Department	Type Dept. Code	**College**	Type College Code	
Module Leader	Wasan Kadhim Saad	**e-mail**	E-mail { was-saad@atu.edu.iq}	
Module Leader's Acad. Title	Asst. Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)	**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025	**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. To study the satellite systems and their transmitting and receiving stations with knowledge of the different types of orbits. 2. To derive the antenna parameters and the power radiated by the isotropic antenna of ground stations. 3. To study the effect of system noise temperature on the receiving equipment of the satellite systems. 4. To understand the effect of different atmospheric conditions on signal transmission for the individual link performance over satellite systems. 5. To study the overall link performance with transparent satellite 6. To understand the basic characteristics of satellite networks

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will be able to identify the basic components of a satellite communications system.
Indicative Contents المحتويات الإرشادية	Need some more information about mathematical Modula

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

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

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	67	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	INTRODUCTION: The birth of satellite communications, Satellite com. services, Satellite com. system, The organization of a satellite communications system (Space segment, Earth segment).
Week 2	Types of orbits (Elliptical orbits, Circular Low Earth Orbits (LEO), Circular Medium Earth Orbits (MEO), Geostationary Obits (GO)), The altitude of satellite in GO.
Week 3	LINK ANALYSIS: The characteristic parameters of an antenna (gain, the angular beam width), The power emitted in a given direction (Effective isotropic radiated power (EIRP), power flux density).
Week 4-5	Radio power, Received signal power (power received by the receiving antenna, Example 1: Uplink received power, Example 2: Downlink received power. Additional losses.
Week 6-7	Noise power spectral density at the receiver input: The origins of noise, Noise characterization, Noise temperature of a noise source, Effective input noise temperature, Effective input noise temperature of an attenuator, Effective input noise temperature of cascaded elements, Effective input noise temperature of a receiver.
Week 8	Noise temperature of an antenna: Noise temperature of a satellite antenna (uplink), Noise temperature of an earth station antenna (the downlink), 'Clear sky' conditions, Conditions of rain, System noise temperature,
Week 9	INDIVIDUAL LINK PERFORMANCE: Carrier power to noise power spectral density ratio at receiver input. Example 1: Uplink (clear sky), Example 2: Downlink (clear sky).
Week 10	Link performance under rain conditions: Example 3: Up link (with rain), Example 4: downlink (with rain).
Week 11	OVERALL LINK PERFORMANCE WITH TRANSPARENT SATELLITE: Characteristics of the satellite channel, Satellite power flux density at saturation, Satellite EIRP at saturation, Satellite repeater gain, Input and Output Back-Off, Carrier power at satellite receiver input.
Week 12	Expression for (C/N0)T: Expression for (C/N0)T without interference from other systems or intermodulation, Expression for(C/N0)T taking account of interference, Expression for(C/N0)T taking account of intermodulation and interference.
Week 13-14	Example [calculation the repeater gain at saturation$(G_{sat})_{SL}$, the $(C/N_O)_{U,sat}$, $(C/N_O)D_{,sat}$, and $(C/N_O)_{T,sat}$, the IBO, OBO, $(C/N_O)_U$, and $(C/N_O)_D$ for $(C/N_O)_T$ = 80dB, the (C/NO)T under the rain causing an attenuation of (6dB) on the up-link.
Week 15	The basic characteristics of satellite networks.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	➢ Gerard Maral and Michel Bousquet ,"Satellite Communications Systems; Systems, Techniques and Technology", *Fifth Edition, John Wiley & Sons Ltd.*, 2009.	Yes
Recommended Texts	➢ Dennis Roddy," Satellite Communications", *Fourth Edition, McGraw-Hill Companies, Inc.*, 2006.	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

اتصالات الموبايل

Module Information معلومات المادة الدراسية		
Module Title	Mobile communications	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☐ **Lecture** ☒ **Lab**
Module Code	ATU11810	

ECTS Credits	**6**		☐ **Tutorial** ☐ **Practical** ☐ **Seminar**		
SWL (hr/sem)	**150**				
Module Level	UGx11		**Semester of Delivery**	2	
Administering Department			**College**	NETC	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	Nasir Hussein Selman		**e-mail**	Coj.nas@atu.edu.iq	
Scientific Committee Approval Date	01/05/2025		**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	36. To expose the students to the most recent technological developments in Mobile communication systems. 37. To introduce universal cell phone coverage concept. 38. To understand the characteristics of cellular system. 39. To learn cellular system infrastructure.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	22. View the development of mobile networks. 23. Understanding the coverage concepts of the mobile networks. 24. Applying the probability, statistics and traffic theory in mobile networks. 25. Understanding mobile radio propagation and channel coding with error control. 26. Understanding the multiple division techniques. 27. Study the traffic channel allocation.
Indicative Contents المحتويات الإرشادية	16. Modulation. 17. Coverage concepts. 18. Traffic theory. 19. Radio propagation and channel coding. 20. Traffic channel allocation.

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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 #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
	Total assessment		100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction:** history of cellular system; generation cellular systems and services
Week 2-5	**GSM network:** network structure; cell capacity; handoff region concept; bandwidth utilization by frequency reuse; clustering techniques; Probability, Statistics, and Traffic in GSM; Radio propagation in GSM; Channel coding in GSM; Multiple Accesses in GSM; GSM modulation techniques; Traffic Channel Allocation in GSM.

Week 6-8	**3G network(UMTS):** network structure; cell capacity; handoff region concept; bandwidth utilization by frequency reuse; clustering techniques; Probability, Statistics, and Traffic in UMTS; Radio propagation in UMTS; Channel coding in UMTS; Multiple Accesses in UMTS; UMTS modulation techniques; Traffic Channel Allocation in UMTS.
Week 9	**Multi-Antenna Techniques:** diversity, selective, Maximal ratio, equal gain, optimum combining; MIMO channels; MIMO detection; spatial modulation; massive MIMO.
Week 10	**Mid-Term Exam**
Week 11-12	**3GPP Long Term Evolution (LTE)**: introduction; basic concepts of LTE; LTE protocols; LTE advanced.
Week 13-14	**5G Mobile Network:** network structure; cell capacity; handoff region concept; bandwidth utilization by frequency reuse; clustering techniques; Probability, Statistics, and Traffic in 5G; Radio propagation in 5G; Channel coding in 5G; Multiple Accesses in 5G; 5G modulation techniques; Traffic Channel Allocation in 5G.
Week 15	**Global Positioning System (GPS)**: GPS system overview; segments of GPS; how GPS determines position; sources of errors; GPS receiver.
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- Principles of Mobile Communication By Gordon L. Stüber	yes
Recommended Texts	1 -أنظمة الاتصالات النقالة : الدكتور خالد يزبك و المهندس محمد الشريف 2-Modern digital and analog communication systems by B. P. Lathi & Zhi Ding	no
Websites		

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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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

صيانة أجهزة الاتصالات

Module Information معلومات المادة الدراسية		
Module Title	Communication Devices Maintenance	**Module Delivery**
Module Type	**Core**	☐ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical**
Module Code	ATU11811	
ECTS Credits	**6**	

SWL (hr/sem)	**150**	☐ **Seminar**	
Module Level	UGx1	**Semester of Delivery**	2
Administering Department		**College**	NETC
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	
Peer Reviewer Name	Nasir Hussein Selman	**e-mail**	Coj.nas@atu.edu.iq
Scientific Committee Approval Date	01/05/2025	**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	هدف مادة "صيانة أجهزة الاتصالات" إلى تزويد الطلاب بالمعرفة والمهارات العملية اللازمة **لتشخيص وإصلاح وصيانة مختلف أنواع أجهزة وأنظمة الاتصالات**، بما يضمن استمراريتها وكفاءتها التشغيلية. **1.فهم أسس عمل أجهزة الاتصالات:** **2.اكتساب مهارات التشخيص الفني للأعطال:** **3.تطوير مهارات الإصلاح والصيانة:** **4.التعامل مع أنواع مختلفة من الأجهزة والتقنيات:**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	بناءً على الأهداف التي ذكرناها سابقًا، يمكن صياغة مخرجات التعلم على النحو التالي: عند الانتهاء من هذه المادة، يتوقع أن يكون الطالب قادرًا على: • **وصف** المبادئ الأساسية لعمل أجهزة الاتصالات المختلفة (اللاسلكية والسلكية). • **تحديد** المكونات الرئيسية والدوائر الإلكترونية في أجهزة الاتصالات ووظائفها. • **تفسير** أنواع الأعطال الشائعة في أجهزة الاتصالات وأسبابها المحتملة. • **شرح** إجراءات السلامة المهنية المتبعة عند التعامل مع أجهزة ومكونات الاتصالات.

	• **فهم** الوثائق الفنية والرسوم البيانية (Schematics) الخاصة بأجهزة الاتصالات. • **تشخيص** الأعطال المعقدة في أجهزة الاتصالات بشكل منهجي ومنطقي. • **تحليل** المشكلات الفنية وتحديد الأسباب الجذرية للأعطال. • **اختيار** أدوات الفحص والاختبار المناسبة لتحديد العطل بدقة. • **تقييم** جدوى إصلاح الجهاز مقارنة باستبداله بناءً على التكلفة والتعقيد.
Indicative Contents المحتويات الإرشادية	**الوحدة 1**: مقدمة في صيانة أجهزة الاتصالات **(Introduction to Telecommunications)** **الوحدة 2**: الأدوات والمعدات المستخدمة في الصيانة**(Tools & Equipment for Maintenance)** **الوحدة 3**: صيانة الدوائر والمكونات الإلكترونية**(Electronic Circuits & Components Maintenance)** **الوحدة 4**: صيانة أجهزة الاتصالات اللاسلكية**(Wireless Communication Devices Maintenance)** **الوحدة 5**: صيانة أجهزة الاتصالات السلكية وشبكات البيانات**(Wired & Data Network Devices Maintenance)**

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 experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	
Week 2-5	
Week 6-8	
Week 9	
Week 10	
Week 11-12	
Week 13-14	
Week 15	
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	**مقدمة في الصيانة وأخلاقيات العمل** : • **تعريف الصيانة :**مفهومها، أهميتها في قطاع الاتصالات. • **أنواع الصيانة :**وقائية، تصحيحية، تنبؤية (مع أمثلة من أجهزة الاتصالات والموبايل). • **أهداف الصيانة :**تقليل الأعطال، زيادة عمر الجهاز، تحسين الأداء. • **سلامة العمل المهنية :**التعامل مع الكهرباء الساكنة ، استخدام أدوات الوقاية الشخصية، سلامة التعامل مع المكونات الكيميائية. • **أخلاقيات مهنة الصيانة :**التعامل مع بيانات العملاء، الشفافية، الاحترافية.
Week 2	**الأدوات والمعدات الفنية(Technical Tools & Equipment)** • **الأدوات اليدوية :**مفكات دقيقة، كماشات، ملاقط، أدوات فتح الأجهزة. • **أجهزة القياس الأساسية :** ○ **متعدد القياسات :(Multimeter)** قياس الجهد، التيار، المقاومة، فحص التوصيل. ○ **راسم الذبذبات :(Oscilloscope)** فهم الإشارات الكهربائية.

	○ **مزود الطاقة الكهربائية :(DC Power Supply)** استخدامه في تشغيل الأجهزة. • **أجهزة اللحام وفك اللحام :** ○ كاوية اللحام (Soldering Iron) للمكونات التقليدية. ○ محطة اللحام الهوائي الساخن (Hot Air Rework Station) للمكونات السطحية.(SMD) ○ شفاطات القصدير، مواد اللحام.(Flux, Solder) **معدات تنظيف وصيانة الأجهزة :**سوائل التنظيف، فرش التنظيف، مجففات.
Week 3	**الدوائر والمكونات الإلكترونية الأساسية في أجهزة الاتصالات والموبايل(Electronic Circuits & Components)** • **مراجعة مكونات الدوائر :**مقاومات، مكثفات، ملفات، دايودات، ترانزستورات. • **الدوائر المتكاملة :(ICs)** أنواعها، وظائفها، وكيفية التعامل معها (مثل المعالجات، شرائح الذاكرة، شرائح الطاقة). • **قراءة المخططات الهندسية (Schematics) والرسوم البيانية (Block Diagrams) للأجهزة :**فهم مسارات الإشارة والطاقة. • **أعطال المكونات الشائعة) :**ارتفاع درجة الحرارة، التلف الفيزيائي، القصر، الفصل.(**تقنيات اللحام وفك اللحام للمكونات الدقيقة والسطحية :**الممارسة العملية.
Week 4-6	**صيانة أجهزة الموبايل – الجانب المادي(Mobile Device Hardware Maintenance)** • **مكونات الهاتف المحمول الرئيسية :**الشاشة(LCD/OLED) ، لوحة اللمس(Digitizer) ، البطارية، الكاميرات، الميكروفونات، السماعات، منافذ الشحن. • **تشخيص أعطال الشاشة واللمس) :**الكسر، عدم الاستجابة، الألوان.(• **مشاكل البطارية والشحن) :**استنزاف سريع، عدم الشحن، التلف.(• **أعطال الكاميرا، الصوت، والمستشعرات.** • **مشاكل أزرار الطاقة والصوت.** • **صيانة منافذ الشحن والسماعات) :**التنظيف، الاستبدال.(• **إجراءات فك وتركيب المكونات الداخلية للهاتف.(Disassembly & Reassembly)** **استبدال المكونات التالفة) :**الشاشات، البطاريات، الكاميرات، منافذ الشحن.(
Week 7-10	**صيانة أجهزة الموبايل – الجانب البرمجي(Mobile Device Software Maintenance)** • **نظم تشغيل الموبايل - Android, iOS) :**نظرة عامة.(• **مشاكل البرمجيات الشائعة) :**التوقف المفاجئ، التهنيج، بطء الأداء، عدم الاستجابة.(• **تحديثات نظام التشغيل (OS Updates) والبرامج الثابتة.(Firmware)** • **إعادة ضبط المصنع (Factory Reset) والمسح الآمن للبيانات.** • **استخدام أدوات الفلاش والبرمجيات الخاصة) :**لإعادة تثبيت النظام أو إصلاح الأخطاء.(• **التعامل مع مشاكل الشبكة في الموبايل) :**عدم وجود إشارة، عدم الاتصال بالإنترنت، مشاكل الواي فاي والبلوتوث.(**إزالة الفيروسات والبرامج الضارة.**
Week 11-12	تشخيص وإصلاح أعطال متعددة في أجهزة موبايل حقيقية.... مع اختبارات

Week 13-14	**صيانة أجهزة الاتصالات اللاسلكية(Wireless Telecommunication Devices Maintenance)** • **مكونات أجهزة الإرسال والاستقبال اللاسلكية) :**وحداتRF ، الهوائيات، المذبذبات.(• **تشخيص أعطال الهوائيات وخطوط التغذية) :(Feedlines)** قياسSWR ، تحديد فقدان الإشارة.(• **صيانة أجهزة شبكة Wi-Fi ونقاط الوصول) :(Access Points)** مشاكل التغطية، التداخل، الاتصال.(• **مشاكل أجهزة الراديو المحمولة والثابتة.(Walkie-Talkies, Base Stations)** **فهم أعطال الأجهزة في أنظمة الاتصالات الخلوية) :(Base Transceiver Stations - BTS)** مكوناتها الأساسية وأعطالها الشائعة – نظرة عامة.(
Week 15-16	**صيانة أجهزة الاتصالات السلكية وشبكات البيانات(Wired & Data Network Devices Maintenance)** • **الكابلات وأنواعها.(UTP, STP, Coaxial, Fiber Optic) :** • **اختبار الكابلات) :**باستخدامCable Testers ، OTDRللألياف الضوئية.(• **أجهزة الشبكات) :**الموجهاتRouters ، المحولاتSwitches ، المودم.(Modems • **تشخيص أعطال الشبكة) :**مشاكل الاتصال، سرعة البيانات، الحزم المفقودة.(• **صيانة وربط الألياف البصرية) :**التنظيف، اللحام.(Fusion Splicing • **صيانة أجهزة الاتصالات الهاتفية) :(PBX/VoIP)** مشاكل الاتصال، جودة الصوت.(

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**"Mobile Phone Repairing: A Complete Guide for Beginners to Advanced Professionals"** **"Basic Electronics for Mobile Phone Repair"**	
Recommended Texts	**- "Troubleshooting & Repairing Consumer Electronics"** **– كتيبات الخدمة (Service Manuals) ومخططات الدوائر (Schematics) الخاصة بالشركات المصنعة**	
Websites	1. **قنوات ومواقع متخصصة في صيانة الموبايل على:YouTube** 2- **منتديات ومجتمعات الصيانة عبر الإنترنت**	

Grading Scheme
مخطط الدرجات

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

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

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