University of AL Kitab/ College of Engineering/

Department of Survey Engineering

Quality Assurance and University Accreditation

Course Descriptions | 2025–2026

Appendix -4

University of AL KITAB

College of Engineering

Surveying Department

Description of Academic Program

Academic Year 2025-2026

First cycle – Bachelor's Degree (B.Sc.) - Surveying Engineering

Republic of Iraq
Ministry of Higher education and Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation
International Accreditation Dept.

University of AL-Kitab

College of Engineering

Department of Surveying Engineering

S.M.J.

Dean of Engineering College
Name: Prof. Dr. Sabah M. Jamel
Date: 1 / 12 / 2025

Al Kitab University College of Engineering

Dean´s Assistant for Scientific Affairs

Name: Dr. Salim Yahiya Qassim
Date: / 12 / 2025

Manager of College Quality Assurance &Univ. Performance

Name: Dr. Noor Nabil
Date: / 12 / 2025

SEMESTER ONE

1. GE 03

Module Information			
Module Title	ENGLISH LANGUAGE I	**Module Delivery**	
Module Type	CORE	☒ **Theory** **Lecture** **Lab** ☐ **Tutorial** **Practical** ☐ **Seminar**	
Module Code	GE 03		
ECTS Credits	3		
SWL (h/sem)	75		
Module Level	2	**Semester of Delivery**	
Administering Department	Type Dept. Code	**College**	Type College Code
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	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Aims	1- The aim of this course is to empower students with the language and life skills 2- The integrated skills approach of the course develops the student's self-confidence 3- succeed in professional and social encounters within an English-speaking global co 4- using language to express knowledge of Environment and health impacts hazardou
Module Learning Outcomes	A1) FIND AND UNDERSTAND INFORMATION ABOUT VOCABULARY, PRONUNCIATION, USAGE, AND GRAMMAR IN REFERENCE TEXTS, ONLINE RESOURCES, AND ENGLISH LANGUAGE DICTIONARIES, (A2) DEVELOP CONVERSATIONAL ENGLISH SKILLS NECESSARY FOR BECOMING A CONTRIBUTING PARTICIPANT IN SMALL GROUP

	ACTIVITIES, LARGE GROUP DISCUSSIONS, AND ORAL PRESENTATIONS, (A3) UNDERSTAND TEXTS USING EFFECTIVE LEARNING STRATEGIES FOR READING AND VOCABULARY BUILDING,
Indicative Content	Speaking, reading and writing

Learning and Teaching Strategies

Strategies	Lecture and classroom discussion

Student Workload (SWL)

Structured SWL (h/sem):33 الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w):75** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem);42 الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w);14** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem):164 الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	20% (20)	5, 10	1,2
	Assignments	2	10% (10)	2, 12	3,1
	Projects / Lab.	0	0	0	0
	Composition	1	10% (10)	13	3,1
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	1,2
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Unit 1,2
Week 2	Unit 3,4
Week 3	Unit 5,6
Week 4	Unit 7,8

Week 5	Unit 9,10
Week 6	Unit 11
Week 7	Unit 12
Week 8	Unit 13
Week 9	Unit 14
Week 10	General discussion
Week 11	Composition Writing
Week 12	English for Specific Purposes
Week 13	English for Specific Purposes
Week 14	English for Specific Purposes
Week 15	English for Specific Purposes
Week 16	**General discussions**

2.GE 111

Module Information			
Module Title	**MATHEMATICS I**	**Module Delivery**	
Module Type	**BASIC LEARNING ACTIVITIES**	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**SE111**		
ECTS Credits	**6**		
SSWL (hr/sem)	66		
USSWL (hr/sem)	**64**		
SWL (hr/sem)	**30**		

Module Level	1	**Semester of Delivery**	1
Administering Department	CED	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Prof. Asst. Prof.	**Module Leader's Qualification**	Ph.D. Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	14/06/2023	**Version Number**	1.0

Relation with other Modules			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Introduce basic definition and explain the basic concepts that essential in connection with Limits and continuity and illustrate these concepts by examples. 2. Introduce the basic concept and rules of differentiations and their applications. 3. Introduce basic definition and explain the basic concepts that essential in connection with function and their graph. 4. Summarizing the definition and explain the concepts and the essential of transcendental functions including their derivatives, graphs and applications and illustrate these concepts by examples. 5. Introducing basic definition and explain the basic concepts that essential in connection with Hyperbolic functions including their derivatives, graphs and applications and illustrate these concepts by examples.
Module Learning Outcomes	1. Enable students to solve the Limits. 2. Enable students to classify functions that have continuity or not.

	3. Graphing all types of functions. 4. Summarize the rules of differentiations. 5. Describing and solving the chain rule and the implicit differentiation. 6. Discussing and solving the applications of derivatives. 7. Describing the transcendental functions including their derivatives, applications and graphs. 8. Describing the Hyperbolic functions and their graphs.
Indicative Contents	Part A – Limits, Functions and Continuity Introduction definition of functions including the domain and range. In addition, preview the rules of differentiation. [12 hrs] Part B – Graph Functions Graphing all types of functions. [12 hrs] Part C – Application on derivatives Definitions of chain rules and the implicit of derivatives and including the applications on differentiations. [12 hrs] Part D – Transcendental functions Definitions, types and derivatives of functions and their inverse of the transcendental functions and including their graphs and applications. [10 hrs] Part E – Hyperbolic functions Definitions, types and derivatives of functions and their inverse of the hyperbolic functions and including their graphs. [10 hrs]

Learning and Teaching Strategies

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)

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	66	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**130**		

Module Evaluation

		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.	-	-	-	-
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	20% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction – Limits and continuity
Week 2	Type of functions, domain and range
Week 3	Rules of derivatives
Week 4	Examples on differentiations
Week 5	Trigonometric Functions
Week 6	Inverse Trigonometric Functions
Week 7	Mid-term Exam
Week 8	Graph of functions
Week 9	Chain rules
Week 10	Implicit differentiations
Week 11	Applications on differentiations
Week 12	Derivatives and graph the functions of hyperbolic functions.
Week 13	Derivatives and graph the inverse functions of hyperbolic functions.
Week 14	Derivatives and graph the functions of transcendental functions.
Week 15	Derivatives and graph the inverse functions of transcendental functions.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	-------------

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts	Thomas' Calculus, Early Transcendentals by George B. Thomas	Yes
Recommended Texts	Calculus by Howard Anton	No

3.SE 114

Module Information			
Module Title	PRINCIPALS IN CIVIL ENGINEERING AND PROFESSION ETHICS	Module Delivery	
Module Type	BASIC	☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	SE 114		
ECTS Credits	8		
SWL (hr/sem)	160		

Module Level	1	Semester of Delivery	1 and 2
Administering Department	Type Dept. Code	College	College of Engineering
Module Leader		e-mail	E-mail
Module Leader's Acad. Title	Asst. Professor	Module Leader's Qualification	Ph.D.
Module Tutor	Name (if available)	e-mail	
Peer Reviewer Name	Name	e-mail	-
Scientific Committee Approval Date	01/06/2023	Version Number	1.0

Relation with other Modules			
Prerequisite module	None	Semester	
Co-requisites module	None	Semester	

Module Aims, Learning Outcomes and Indicative Contents

Module Objectives	**تتضمن أهداف المادة الدراسية معرفة الأتي:** 1. مراحل إنشاء المباني وطريقة وضع فكرة المشروع واهدافه ومدى الحاجة اليه. 2. تصنيف المنشأت المدنية حسب التصميم أو مواد التشييد أو الوظيفة. 3. خطوات تنفيذ المشاريع. 4. تعلم أهمية تحريات التربة والغاية منها. 5. التعريف ومن خلال مقدمة عامة بعلم المساحة وأنواعها والغاية من القيام بالأعمال المساحية. 6. تعلم أهمية مادة السمنت كمكون أساسي في صناعة الخرسانة وأستخداماتها في المشاريع الأنشائية 7. التعرف على خصائص الخرسانة وأهم الفحوصات التي تجرى لها في موقع التنفيذ أوالمختبرات فضلاً عن ماهية المضافات الخرسانية وأنواعها والغرض من أستخدامها. 8. كيفية أجراء التخمين الهندسي وحساب الكميات وتنظيم جدول كميات مفصل وحساب الكلفة. 9. التعريف باخلاقيات المهنة الهندسية وما هي اهم وابرز عناصرها الواجب على المهندس التقيد والالتزام بها في حياته المهنية الهندسية.
Module Learning Outcomes	**من مخرجات المادة الدراسية أن يكون الطالب متعلماً ومؤهلاً للأتي:** 1. تعلم طرق التخطيط لأنشاء المشاريع الهندسية. 2. تعلم كيفية تصنيف المنشأت الهندسية. 3. تعلم دور مهندس المساحة في إنشاء المباني ومهامه. 4. تعلم أنواع المواد الانشائية وطرق تصنيعها وإمكان الاستخدام. 5. تعلم كيفية أجراء التخمين الهندسي وحساب الكميات وتنظيم جدول كميات مفصل يتضمن الكلف لغرض التخطيط للتنفيذ. 6. تعلم كيفية إعداد جداول الكميات لتنفيذ المشاريع وكذلك حساب كمية المواد الأولية لكل فعالية من العمل.
Indicative Contents	**المحتويات التعليمية تتضمن:** 1. **مراحل انشاء المباني وانواعها** وتتضمن وضع فكرة المشروع واهدافه ومدى الحاجة اليه، تفصيل متطلبات المشروع، التصميم الهندسي، تصنيف المباني والمشاريع على أسس مختلفة، جدول تقدم العمل، خطوات التنفيذ). (12 ساعة) 2. **تحريات التربة** وتتضمن أهميتها وكيفيتها والغرض من استكشاف التربة، الأختبارات الحقلية والمعملية للتربة (12 عشر اختباراً معملياً)، أعداد تقرير تحريات التربة). (8 ساعات) 3. **علم المساحة** ويتضمن تعريف اعمال المساحة، أنواع المساحة، تصنيف المساحة، الخطوات الرئيسية للرفع المساحي، اعمال مهندس المساحة أو المساح في المباني والانشاءات). (10 ساعات) 4. **السمنت** ويتضمن الموضوع أنواع السمنت، مكوناته "التركيبة الكيمياوية"، أستخداماته، السمنت الطبيعي). (6 ساعات) 5. **الخرسانة** (مكوناتها، تطور صناعتها، خصائصها الفيزيائية، أنواعها، الخرسانة المسلحة وأنواعها، أختبارات الخرسانة الطرية "الحقلية والمختبرية"، أختبارات الخرسانة الصلبة، الاختبارات الغير متلفة والشبه متلفة والمتلفة للخرسانة) (10 ساعات) 6. **المضافات الخرسانية** (أهميتها والغرض من أضافتها، مدى توافقها مع مكونات الخرسانة وفيما بينها، أنواعها، المواصفات الخاضعة لها). (6 ساعات) 7. **التخمين الهندسي** (ماهية التخمين والغرض منه، فوائده، أعداد دراسة الجدوى للمشاريع، تقدير الكلف النشائية، طرق التخمين المختلفة). (6 ساعات) 8. **حساب الكميات** (كيفية ذلك، التعرف على المخططات التصميمية، أعداد جداول الكميات، حساب تفصيلي لكميات الاعمال الانشائية بالطرق القياسية، تحليل الفقرات الانشائي، حساب كميات اعمال الانهاءات). (10 ساعات) 9. **أعداد التقارير العلمية**. (4 ساعات)
Learning and Teaching Strategies	
Strategies	سيتم اعتماد الدراسة النظرية مع الجانب التطبيقي لتكون عملية التدريس تطبيقية وليست نظرية تلقينيه صرفه. سيتم اخضاع الطلبة إلى أسئلة العصف الذهني وأشراكهم من خلال المناقشات فضلاً عن الزيارات الحقلية والمعملية للتعرف على المبادئ العامة للهندسة المدنية من خلال مشاريع الجامعة التي هي قيد التشييد. سيخضع الطلبة الى مجموعة من الاختبارات المفاجئة والشهرية والفصلية لتقييم مخرجات التعلم.

Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	90	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	160		

Module Evaluation

		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)

Week no.	المادة العلمية
Week 1	انشاء المباني وانواعها (الجزء الأول)
Week 2	انشاء المباني وانواعها (الجزء الثاني)
Week 3	انشاء المباني وانواعها (الجزء الثالث)
Week 4	انشاء المباني وانواعها (الجزء الرابع)
Week 5	تحريات التربة (الجزء الأول)
Week 6	تحريات التربة (الجزء الثاني)
Week 7	تحريات التربة (الجزء الثالث)
Week 8	علم المساحة (الجزء الأول)
Week 9	علم المساحة (الجزء الثاني)
Week 10	علم المساحة (الجزء الثالث)
Week 11	السمنت (الجزء الأول)
Week 12	السمنت (الجزء الثاني)
Week 13	الخرسانة (الجزء الأول)

Week 14	الخرسانة (الجزء الثاني)
Week 15	الخرسانة (الجزء الثالث)
Week 17	المضافات الخرسانية (الجزء الأول)
Week 18	المضافات الخرسانية (الجزء الثاني)
Week 19	أعداد التقارير العلمية (الجزء الأول)
Week 20	أعداد التقارير العلمية (الجزء الثاني)
Week 21	التخمين الهندسي (الجزء الأول)
Week 22	التخمين الهندسي (الجزء الثاني)
Week 23	التخمين الهندسي (الجزء الثالث)
Week 24	التخمين الهندسي (الجزء الرابع)
Week 25	التخمين الهندسي (الجزء الخامس)
Week 26	حساب الكميات (الجزء الأول)
Week 27	حساب الكميات (الجزء الثاني)
Week 28	حساب الكميات (الجزء الثالث)
Week 29	حساب الكميات (الجزء الرابع)
Week 30	حساب الكميات (الجزء الخامس)

Delivery Plan (Weekly Lab. Syllabus)

Week 1	التعرف على مراحل انشاء المباني (المشاريع)
Week 2	فحوصات التربة (المختبرات)
Week 3	فحوصات السمنت (المختبرات)
Week 4	فحوصات الخرسانة (المختبرات)
Week 5	فحوصات الخرسانة (المشاريع)
Week 6	حساب الكميات (المشاريع)
Week 7	حساب الكميات (المشاريع)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	إنشاء المباني (أرتين ليفون، زهير ساكو)، كلية الهندسة / جامعة بغداد الطبعة	Yes
Recommended Texts	Principles & Practice of Civil Engineering: The Most Effective Review for the PE Exam 3rd Edition	No
Websites	https://slideplayer.com/slide/10731501/	

4. SE 113

Module Information					
Module Title	Engineering Mechanics			**Module Delivery**	
Module Type	Basic learning activities			☒ Theory ☒ Lecture ☐Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**SE113**				
ECTS Credits	**6**				
SWL (hr/sem)	66				
Module Level	1		**Semester of Delivery**		
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**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	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Module			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	• Introduce basic definitions and introductory concepts of engineering mechanics/statics.

	• Analyze forces and find out the resultant forces in two and three dimension • Differentiate between various type of supports and draw free-body-diagram, Compute the reaction force in simple structure (beam, frame, truss) • Obtain center of gravity and centroid for deferent engineering shapes & moment of inertia for deferent sections
Module Learning Outcomes	• Analyze forces and moments in two and three dimensions, • Find out the resultant forces in two and three dimensions • Draw free-body-diagram, Compute the reaction force in simple structure (beam, frame, truss) • Study Mechanism and laws of friction • Obtain and centroid for deferent engineering shapes. • Obtain moment of inertia for deferent engineering shapes • Understand the engineering applications that evolve dynamics. • Solve engineering problems involving objects moving along a linear path. • Simplify engineering problems involving objects moving along a curved path. • Recognize and deal with projectile problems. • Write the equation of motion of a moving object. • Solve problems involving the force in accelerated bodies. • Apply the theorem of conservation of energy to solve kinetic problems.
Indicative Contents	• Introduction to engineering mechanics: statics. In addition, Resolution of forces into components(two dimensions) and Resolution of forces into components(three dimensions) and Principle of Moments and Couples Part B – <u>Resultant of forces</u>) Resultant of coplanar forces system(concurrent, parallel Resultant of coplanar forces system (non-concurrent and non- parallel) Resultant of Non coplanar forces system (concurrent, parallel) Resultant of Non coplanar forces system (non-concurrent and non- parallel). [12 hrs]
Learning and Teaching Strategies	

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)

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**60**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2
	Assignments	/	10% (10)		
	Projects / Lab.	0	/	/	All
	Report	1	0	/	
Summative assessment	**Midterm Exam**	2hr	10% (10)	4	LO #1 - #7
	Final Exam	3hr	70% (30)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction to engineering mechanics: statics UNITS OF MEASUREMENT
Week 2	• Resolution of forces into components(two dimensions)

Delivery Plan (Weekly Lab. Syllabus)

Week 3	• Principle of Moments and Couples
Week 4	• Resolution of forces into components(three dimensions)
Week 5	• Principle of Moments and Couples (three dimensions)
Week 6	• Resultant of coplanar forces system(concurrent, parallel)
Week 7	• Resultant of coplanar forces system (non-concurrent and non- parallel)
Week 8	• Resultant of Non coplanar forces system (concurrent, parallel)
Week 9	• Resultant of Non coplanar forces system (non-concurrent and non- parallel)
Week 10	• Equilibrium and Free-Body Diagram
Week 11	• Analysis of Frames in the Plane
Week 12	• Analysis of Trusses in the Plane
Week 13	• Friction
Week 14	• Centroids by integration
Week 15	• Centroids of composite areas bodies
Week 16	• Moment of Inertia by integration and Moment of Inertia of composite areas bodies

Learning and Teaching Resource

	Text	Available in the Library?
Required Texts	1. Engineering Mechanics: Statics & Dynamics 3rd edition. By Archie Highdon & William B. Stiles, 1968. 2. Engineering Mechanics: Statics & Dynamics 13th edi. By R.Hibbeler, 2015	Yes/online
Recommended Texts	1. Beer, F. P. and Johnston, E. R., "Mechanics for Engineers", 3rd Ed., McGraw Hill, 1984. 2. Pytel, A. and Kiusalaas, J. "Engineering Mechanics",3rd Ed., Cengage Learning, 2010 3.Engineering Mechanics: Statics 6th edition by J.L. Meriam & L.G. Kraige, 2007	Yes/ Online
Websites		

4. SE 115

Module Information					
Module Title	**COMPUTER HARDWARE AND SOFTWARE**		**Module Delivery**		
Module Type	**BASIC**		☒ Theory ☒ Lecture ☒ Lab ☒ Tutorial ☐ Practical ☐ Seminar		
Module Code	**SE 115**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	/		**College**	/	
Module Leader			**e-mail**		
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	Msc	
Module Tutor	Asst. lecturer: Younis Farouk		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

Relation with other Module			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم و المحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. learn the students and define of hardware parts of computer 2. To learn the student components each part of hardware and how its work 3. To learn the student maintenance of hardware parts and how to detect malfunction. 4. learn the student, the operation systems of computer and its types. 5. To learn the student cyber security concept and how save data from theft on internet 6. To learn the student types of viruses and how protect his computer from its 7. To learn the student fundamental of Word program and learn all tools in this program 8. To learn the student fundamental of Excel program and learn all tools in this program
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. learn the computer mechanism and address each function of component 2. develop the ability to deal with computers. 3. software installing and update the programs with drivers. 4. firewall and antivirus to prevent the most dangerous of attack. 5. secure the computer and the main method of avoid the hackers. 6. Private the network and your information and everything that related your personality and your accounts. 7. Importance of word program in write and edit all text, save, print the file, editing text, insert (table picture, chart, …) 8. Add page layout (margins, size, column), watermark, page color, page border in word program 9. Spelling correction, types of document view, rulers in word program 10. Importance of excel language in create, edit, sort, analyze, and summarize data in addition to functions to perform arithmetic and statistical calculations. 11. write the formula and mathematical function in excel and solve logic and math problems. 12. Plot the 2D & 3D chart
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The physical parts of a computer, Power Supply, CPU, Motherboard, hard disk, ROM, RAM, GPU (20 hours) computer privacy, computer security, Computer Crime, virus, worm, Trojan horse (15 hours) Operating systems, drivers, installation, format, add and remove program, network setting (15 hours) word program, home menu, Insert menu, design menu, layout menu, Review menu, view menu (20hours) Excel program, function , formula , chart , table (30 hours)

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	
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**	30 min/3	10% (10)	5, 11 and 15	
	Assignments				
	Projects / Lab.	30 min /3	10% (10)	Continuous	All
	Report				
Summative assessment	**Midterm Exam**	2hr/3	30% (30)	9,12,16	
	Final Exam	3hr/1	50% (50)	17	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computer fundamentals: introduction, Computer's components, Types of computers
Week 2	Computer components: The physical parts of a computer. Input and output devices, software entity, system unit.
Week 3	Computer components: Power Supply,CPU, Motherboard ,
Week 4	Computer components: hard disk ,ROM, RAM, GPU

Week 5	Computer safety and software licenses: computer privacy , computer security, intellectual property, electronic intrusion,
Week 6	Computer safety and software licenses : Computer Crime , Malware ,adware , spyware, virus ,worm, Trojan horse
Week 7	Operating systems: introduction , operation system OS, application , drivers.
Week 8	Operating systems: installation, format, add and remove program, network setting.
Week 9	**Midterm Exam**
Week 10	Introduction about word program (use it , version it , install it), interfaces of program, file menu , home menu
Week 11	Insert menu , design menu , layout menu ,Review menu , view menu
Week 12	**Midterm Exam**
Week 13	Introduction about excel program (use it , version it , install it), interfaces and windows of program , menus
Week 14	Solve Logical and mathematical function in excel program
Week 15	Plot 2 D & 3 D chart
Week 16	**Midterm Exam**
Week 17	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: explain about each component of the computer to show students the Hardware component .
Week 2	Lab 2: training the students to change each component of hardware to make them more familiar to dealing with physical parts.
Week 3	Lab 3: install the most important program in the computer and setting the privacy setting to protect their computer from hackers.
Week 4	Lab 4: create document in word program and applicate editing tools (part 1)
Week 5	Lab 5: create document in word program and applicate other editing tools (part 2)
Week 6	Lab 6: create sheet in excel program and solve some of logical and mathematical equations
Week 7	Lab 7: create sheet in excel program and Plot some of the 2D & 3D chart

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	اساسيات الحاسوب و تطبيقاته المكتبية	Yes /online
Recommended Texts		No
Websites		

5. SE 123

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">FUNDAMENTALS OF ENGINEERING DRAWING</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">BASIC</td><td colspan="2" rowspan="4">☒Theory
☒Lecture
☒Lab
☐Tutorial
☐Practical
☐Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE 123</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">150</td></tr>
<tr><td>Module Level</td><td colspan="2">1</td><td colspan="2">Semester of Delivery</td><td>1</td></tr>
<tr><td>Administering Department</td><td colspan="2">Type Dept. Code</td><td>College</td><td colspan="2">Engineering</td></tr>
<tr><td>Module Leader</td><td colspan="2"></td><td>e-mail</td><td colspan="2"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td colspan="2">teacher</td><td colspan="2">Module Leader’s Qualification</td><td>Master's</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Name (if available)</td><td>e-mail</td><td colspan="2">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2">Name</td><td>e-mail</td><td colspan="2">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">01/06/2023</td><td>Version Number</td><td colspan="2">1.0</td></tr>
</table>

<table>
<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The purposes of the course are: 2. 1- To introduce the students to use drawing instruments, use of different types of pencils in an Engineering Drawing and to draw lines, circles, polygon nsd a Curves. 3. 2. To know how to represents letters & numbers in drawing sheet. 4. 3. To introduce the students to use scales and orthographic projections, projections of points & straight lines and solids etc. 5. 4. To make the students draw the projections of the various types of solids in different positions. 6. 5. To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa. 7. 6.To teach the students different Engineering Sections and Basics of dimensioning 8. to develop a knowledge of two-dimensional (2D) computer-aided draughting (CAD).
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of course, the student will be able to: LO#1.Get information about the important tools for engineering drawing and Familiarize with different drawing equipment, technical standards and procedures. LO#2- Learning how to draw the shapes, angels and lines and others which is essential for engineer and Develop student's imagination and ability to represent the shape size and specifications of physical objects. LO#3. For construction of geometric figures. This will give students ability to draw three dimension objects on the paper and to draw the pectoral drawings. LO#4- Explain the principle of projection and understand the main idea of using dimension for engineering drawing LO#5- Explain the principle of sectioning and understand the intersection LO#6- Learning the main idea from assembly and detail drawing
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:- Introduction / drawing instruments, Lettering / title block, Type of lines, Geometric Constructions, Geometric Shapes Orthographic projection on three perpendicular planes, isometric projection ,sectional view, Dimensioning

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The student work will be assessed according to the module tasks. The excises in the drawing hall will be marked weekly. And the homework will be assessed next lecture. During both assessments the student will give the oral and written feedback in order to improve their skills. An exam will be conducted at each end of a topic and The final exam will be done at the end of the semester

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0
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	How to use engineering tools and paper layout with an explanation of the types of engineering lines.
Week 2	Handwriting exercises
Week 3	Engineering Processes
Week 4	Engineering Processes
Week 5	Projection

Week 6	Projection and Dimensions
Week 7	Isometric projection
Week 8	Introduction to CAD, the commands and the techniques
Week 9	demonstrate competency in using some of the standard available features of a CAD application;
Week 10	create and manipulate objects or elements and to modify objects or elements;
Week 11	change object properties;
Week 12	present a drawing in the orthographic and isometric systems of drawing;
Week 13	Layer properties and dimension command,
Week 14	Projection drawing by cad
Week 15	Projection drawing by cad
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to CAD
Week 2	Drawing commands: Line, Construction line, Circle, Rectangle, Ray
Week 3	Modify commands: Erase, Offset, Fillet, Chamfer, Trim, Extend
Week 4	Drawing commands: Polygon, Arc, Ellipse, Polyline ,Multiline, Text, Hatch 1
Week 5	Modify commands: Explode, Move, Copy, Mirror, Rotate, Array, Break Stretch
Week 6	Layer properties and dimension command,
Week 7	Projection drawing by cad
	Projection drawing by cad

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**الرسم الهندسي / عبد الرسول عبد الحسين الخفاف**	Yes
Recommended Texts		
Websites		

SEMESTER TWO

1. GE 01

Module Information معلومات المادة الدراسية					
Module Title	**ARABIC LANGUAGE**			**Module Delivery**	
Module Type	**BASIC**			**Theory**	
Module Code	**GE01**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Water Resources		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	MA	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		
Review Committee Approval	17/6/2023		**Version Number**	1.0	

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	
Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم و المحتويات الإرشادية			
Module Aims أهداف المادة الدراسية	1. العمل على النهوض باللغة العربية و المحافظة عليها من الخطأ.		

	2. أن يكتسب الطالب القدرة على استعمال اللغة استعمالاً صحيحاً في الاتصال بالآخرين عن طريق التحدث والكتابة والاستماع والقراءة، مما ييسر لهم أمورهم ويعينهم على قضاء حوائجهم ومصالحهم. 3. أن يكتسب الطلبة القدرة على التعبير عن أنفسهم وما يقع تحت حواسهم نطقاً وكتابةً. 4. أن يتزود الطالب بثروة لغوية عن طريق تزويدهم ببعض الألفاظ والتراكيب . 5. مساعدة الطلبة على تمييز الأغلاط اللغوية الشائعة وإرشادهم الى تصويبها. 6. تنمية الميل إلى القراءة والمطالعة لدى الطلبة. 7. التعرف على مواطن الجمال في اللغة العربية وآدابها. 8. أن يكتسب الطالب مهارات الاتصال بالتراث العربي وتحقيق التكامل بينه وبين مجالات الثقافة المختلفة. 9. توظيف قواعد اللغة في القراءة والكتابة (من خلال تدريبات مرتبطة بالموضوعات المقترحة) .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- حب الطالب للغة العربية والاعتزاز بها. 2- تدريب الطلبة على سلامة النطق وحسن الإلقاء والتعبير بنبرات صوتية واضحة ، و تزويدهم بكثير من الألفاظ والتراكيب والجمل والأساليب التي تنمي ثروتهم اللغوية وتزيد ثقافتهم. 3- تدريب الطلبة على كتابة الكلمات بصورة صحيحة ، وتثبيت صـــورها في أذهانهم، والقدرة على استعادة تلك الصورعند الكتابة. 4- تمكن الطلبة من معرفة أكثر من خمسين خطأ شائعا ومعرفة تصويبها. 5- معرفة الطلبة طريقة التفريق بين أنواع الهمزة الأولية والمتوسطة والمنتهية والقدرة غلى كتابتها بالشكل الصحيح دون الوقوع في الخطأ. 6- تقويم ألسنة الطلبة، ووقايتهم من الخطأ، وتكوين عادات لغوية سليمة تمكنهم من استعمال الألفاظ والجمل بصورة صحيحة لا تذهب بجمال الكلام وعذوبته.
Indicative Contents المحتويات الإرشادية	نشأة اللغة العربية درس بيان أهمية اللغة العربية بصورة عامة وأهميتها لطلاب غير الاختصاص أقسام الكلام والمعرب والمبني من الأسماء والأفعال الأغلاط اللغوية همزة القطع والوصل رسم الهمزة المتوسطة والمتطرفة

	الحروف التي تزداد في الكتابة علامات الترقيم في اللغة العربية العدد ، قواعد كتابة العدد المبتدأ والخبر أنواع الجموع وما يلحق بها. قصيدة لشاعر قديم قصيدة لشاعر حديث أن وإن والفرق بينهما كتابة الظاء والضاد والتاء المربوطة والهاء
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1) Lectures. 2) Tutorials. 3) Homework and Assignments. 4) Tests and Exams. 5) In-Class Questions and Discussions. 6) Extracurricular Activities. 7) Seminars. 8) In- and Out-Class oral conversations.

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
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	20% (20)	6, 10	LO #1, 2, 3 and 4
	Assignments	2	10% (10)	2, 12	LO # 1, 3
	Projects / Lab.	-	-	-	-
	Report	1	10% (10)	13	LO # 3-5
	Midterm Exam	2 hr	10% (10)	7	LO # 1-5

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	نشأة اللغة العربية
Week 2	درس بيان أهمية اللغة العربية بصورة عامة وأهميتها لطلاب غير الاختصاص
Week 3	أقسام الكلام والمعرب والمبني من الأسماء والأفعال
Week 4	همزة القطع والوصل
Week 5	رسم الهمزة المتوسطة والمتطرفة
Week 6	الأغلاط اللغوية الشائعة
Week 7	علامات الترقيم
Week 8	الحروف التي تزداد في الكتابة
Week 9	العدد، قواعد كتابة العدد
Week 10	أنواع الجموع وما يلحق بها
Week 11	ان المفتوحة والمكسورة
Week 12	المبتدأ والخبر
Week 13	قصيدة لشاعر قديم
Week 14	قصيدة لشاعر حديث
Week 15	كتابة الظاء والضاد والتاء المربوطة والهاء
Week 16	**Final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	مصطفى التوني، الهمزة في اللغة العربية دراسة لغوية. سعد بن على بن محمد ، الفرق بين الضاد والظاء. اللغة العربية العامة لاقسام غير الاختصاص. عبد القادر أمين	Yes
Recommended Texts	يوسف عطا الطريفي الواضح في الاملاء وعلامات الترقيم محمد العدناني ،معجم الاغلاط اللغوية	No
Websites		

2. SE 121

Module Information معلومات المادة الدراسية			
Module Title	**MATHEMATICS II**	**Module Delivery**	
Module Type	**BASIC LEARNING ACTIVITIES**	☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**SE121**		
ECTS Credits	**6**		
SSWL (hr/sem)	66		
USSWL (hr/sem)	**64**		
SWL (hr/sem)	**130**		

Module Level	1	**Semester of Delivery**	2		
Administering Department	CED	**College**	Type College Code		
Module Leader		**e-mail**			
Module Leader's Acad. Title	Prof.	**Module Leader's Qualification**	Ph.D.		
Module Tutor		**e-mail**			
Peer Reviewer Name		**e-mail**			
Scientific Committee Approval Date	14/06/2023	**Version Number**	1.0		

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	SE111	**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	6. Introduce the basic concepts and rules to enable students to solve the integration for both types, the finite and definite and their applications. 7. Clarifying to students how to determine the areas under or between curves and illustrate these concepts by examples. 8. Enable students to determine the volumes generated by revolving the areas about

	specific axis and illustrate these concepts by examples. 9. Introducing the method of Matrix to solve simultaneous equations and illustrate these concepts by examples.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Describing the definite and indefinite integrals. 2. Explaining the methods of integration. 3. Explaining how to determine areas under curves or between corves by using several methods. 4. Calculating the volumes of revolving areas about a specific axis by using several methods. 5. Identifying ho to solve simultaneous equations by using the Matrix Method.
Indicative Contents المحتويات الإرشادية	Part A – Integrations (definite and indefinite integration) Introduction and the definition of integration, the rules of integrations and method of integrations on all functions including the invers functions, hyperbolic functions and transcendental functions. [30 hrs] Part B – Applications on integrations Determining and calculating the areas under and between curves. In addition, determining and calculating the volumes of revolving areas about axes by using several methods. [20 hrs] Part C – Matrix Method Introduction, definitions and types of matrices including the operations on matrices and calculating determinants, cofactors and adjoints of matrices. In addition, includes solving simultaneous equations. [8 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	66	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	64	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**130**		

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.	-	-	-	-
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	20% (20)	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
Week 2	Indefinite Integral
Week 3	Integral of Trigonometric Functions
Week 4	Integral of inverse Trigonometric Functions
Week 5	Integration Factors
Week 6	Integration by Parts
Week 7	Mid-term Exam
Week 8	Trigonometric Substitutions
Week 9	Method of Partial Fraction
Week 10	Definite Integration
Week 11	Integral of Transcendental and hyperbolic functions
Week 12	Area between Curves
Week 13	Volume a Solid Revolution
Week 14	Disk Method- shell method
Week 15	Matrix method
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	-----------

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus, Early Transcendentals by George B. Thomas	Yes
Recommended Texts	Calculus by Howard Anton	No
Websites	------	

3. SE 124

Module Information معلومات المادة الدراسية		
Module Title	ENGINEERING PHYSICS	**Module Delivery**
Module Type	BASIC (B)	☒ **Theory** ☒ **Lecture** ☐ **Lab** ☐☒ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	SE 124	
ECTS Credits	4	
SWL (hr/sem)	100	

Module Level	1	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• To understand Physics and Measurement(Standards of Length, Mass, and Time, Conversion of Units) • To understand Dimensional Analysis and Matter and Model Building. • This course deals with Vectors (Coordinate Systems and Vector and Scalar Quantities • To Know The Force and Laws of Motion.

	• To understand Energy and its Conservation • To know Light and Optics
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize between The Light Reflection and The Light Refraction 2. List the various Optical Instruments associated with physics 3. Summarize Kinetic Energy and the Work–Kinetic Energy Theorem. 4. Discuss the Concept of Force and three Newton's Laws. 5. Describe Vector and Scalar Quantities and Some Properties of Vectors. 6. Define Standards of Length, Mass, and Time and Conversion of Units 7. Identify some physical applications in Geomatis engineering.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Physics and Measurement, Standards of Length, Mass, and Time, Matter and Model Building, Dimensional Analysis, Conversion of Units. [10 hrs.] Vectors, Coordinate Systems, Vector and Scalar Quantities, Some Properties of Vectors, Components of a Vector and Unit Vectors, Scalar Product of Vectors[10 hrs.] The Force and Laws of Motion, The Concept of Force, Newton's First Law, Mass, Newton's Second Law, The Gravitational Force and Weight, Newton's Third Law, Some Applications of Newton's Laws, Forces of Friction[20 hrs.] Energy and its Conservation, Systems and Environments, Work Done by a Constant Force, Kinetic Energy and the Work–Kinetic Energy Theorem, Potential Energy of a System, The Isolated System, Power [20 hrs.] Light and Optics, The Nature of Light, The Ray Approximation, The Light Reflection, The Light Refraction, Fiber Optics, Images Formed by Flat Mirrors, Images Formed by Spherical Mirrors, Thin Lenses, Optical Instruments: The Camera, The Simple Magnifier, The Compound Microscope, The Eye, Myopia, Hyperemia[25 hrs.] Some physical applications in Geomatis engineering [15 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this course is to encourage students' participation both in theoretic and the exercise materials, while at the same time refining and expanding their critical thinking skills regarding this outstanding new technology. This will be achieved through classes, interactive tutorials, field practical sessions, and by considering types of lab training and data processing experiments involving some sampling application case studies 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				
	Projects / Lab.				All
	Report	1	10% (10)	14	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	70% (70)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Physics and Measurement, Standards of Length, Mass, and Time
Week 2	Matter and Model Building, Dimensional Analysis, Conversion of Units
Week 3	Vectors, Coordinate Systems, Vector and Scalar Quantities
Week 4	Some Properties of Vectors, Components of a Vector and Unit Vectors, Scalar Product of Vectors
Week 5	The Force and Laws of Motion, The Concept of Force, Newton’s First Law
Week 6	Mass, Newton’s Second Law, The Gravitational Force and Weight
Week 7	Newton’s Third Law, Some Applications of Newton’s Laws
Week 8	Forces of Friction

Week 9	Energy and its Conservation, Systems and Environments, Work Done by a Constant Force,
Week 10	Kinetic Energy and the Work–Kinetic Energy Theorem, Potential Energy of a System, The Isolated System, Power
Week 11	Light and Optics, The Nature of Light, The Ray Approximation
Week 12	The Light Reflection, The Light Refraction, Fiber Optics
Week 13	Images Formed by Flat Mirrors, Images Formed by Spherical Mirrors, Thin Lenses
Week 14	Optical Instruments: The Camera, The Simple Magnifier, The Compound Microscope, The Eye, Myopia, Hyperemia
Week 15	Some physical applications in Geomatis engineering
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	لايوجد مختبر
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	

Learning and Teaching Resources مصادر التعلم و التدريس		
	Text	**Available in the Library?**
Required Texts	Physics for Scientists and Engineers (with PhysicsNOW and InfoTrac), Raymond A. Serway - Emeritus, James Madison University , Thomson Brooks/Cole © 2004, 6th Edition, 1296 pages	Yes
Recommended Texts	Power point slides of Serway book (Physics for Scientists and Engineers) from Cengage Learning Company	Yes
Websites	(http://www.cengage.com).	

4. SE 115

<table>
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معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">COMPUTER HARDWARE & SOFTWARE</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">B</td><td colspan="2" rowspan="5">☒ Theory
☒ Lecture
☒ Lab
☒ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE 115</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">4</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">100</td></tr>
<tr><td>Module Level</td><td>1</td><td colspan="2">Semester of Delivery</td><td colspan="2">1</td></tr>
<tr><td>Administeg Derinpartment</td><td>/</td><td>College</td><td colspan="3">/</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>lecturer</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">Msc</td></tr>
<tr><td>Module Tutor</td><td></td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td colspan="2">Version Number</td><td colspan="2">1.0</td></tr>
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<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><th colspan="4">Learning and Teaching Strategies
استراتيجيات التعلم والتعليم</th></tr>
<tr><td>Strategies</td><td colspan="3">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.</td></tr>
</table>

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**	30 min/3	10% (10)	5, 11 and 16	
	Assignments				
	Projects / Lab.	30 min /3	10% (10)	Continuous	All
	Report				
Summative assessment	**Midterm Exam**	2hr/3	30% (30)	9,12,17	
	Final Exam	3hr/1	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Computer fundamentals: introduction, Computer's components, Types of computers
Week 2	Computer components: The physical parts of a computer. Input and output devices, software entity, system unit.
Week 3	Computer components: Power Supply,CPU, Motherboard ,
Week 4	Computer components: hard disk ,ROM, RAM, GPU
Week 5	Computer safety and software licenses: computer privacy , computer security, intellectual property, electronic intrusion,
Week 6	Computer safety and software licenses : Computer Crime , Malware ,adware , spyware, virus ,worm, Trojan horse
Week 7	Operating systems: introduction , operation system OS, application , drivers.

Week 8	Operating systems: installation, format, add and remove program, network setting.
Week 9	**Midterm Exam**
Week 10	Introduction about word program (use it , version it , install it), interfaces of program, file menu , home menu
Week 11	Insert menu , design menu , layout menu ,Review menu , view menu
Week 12	**Midterm Exam**
Week 13	Introduction a bout matlab language (use it , version it , install it), interfaces and windows
Week 14	Mathematical operation in matlab language
Week 15	Mathematical functions in matlab language
Week 16	The matrices in matlab language
Week 17	The matrices in matlab language
Week18	**Final exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: explain about each component of the computer to show students the Hardware component .
Week 2	Lab 2: training the students to change each component of hardware to make them more familiar to dealing with physical parts.
Week 3	Lab 3: install the most important program in the computer and setting the privacy setting to protect their computer from hackers.
Week 4	Lab 4: create document in word program and applicate editing tools (part 1)
Week 5	Lab 5: create document in word program and applicate other editing tools (part 2)
Week 6	Lab 6: create programs in matlab language and solve problem of Mathematical operation
Week 7	Lab 7: create programs in matlab language and solve problem of Mathematical operation
Week 8	Lab 8: create programs in matlab language and solve problem of matrices

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	اساسيات الحاسوب و تطبيقاته المكتبية	Yes /online
Recommended Texts		No
Websites		

5. SE 123

Module Information معلومات المادة الدراسية					
Module Title	**FUNDAMENTALS OF ENGINEERING DRAWING**			**Module Delivery**	
Module Type	**BASIC**			☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**SE 123**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	1		**Semester of Delivery**		1
Administering Department	Type Dept. Code		**College**	Engineering	
Module Leader			**e-mail**		
Module Leader's Acad. Title	**teacher**		**Module Leader's Qualification**		Master's
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The purposes of the course are:

	9. Introduce the students to use drawing instruments, use of different types of pencils in an Engineering Drawing and to draw lines, circles, polygon nsd a Curves. 10. To know how to represents letters & numbers in drawing sheet. 11. To introduce the students to use scales and orthographic projections, projections of points & straight lines and solids etc. 12. To make the students draw the projections of the various types of solids in different positions. 13. To represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa. 14. To teach the students different Engineering Sections and Basics of dimensioning
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of course, the student will be able to: LO#1.Get information about the important tools for engineering drawing and Familiarize with different drawing equipment, technical standards and procedures. LO#2- Learning how to draw the shapes, angels and lines and others which is essential for engineer and Develop student's imagination and ability to represent the shape size and specifications of physical objects. LO#3. For construction of geometric figures. This will give students ability to draw three dimension objects on the paper and to draw the pectoral drawings. LO#4- Explain the principle of projection and understand the main idea of using dimension for engineering drawing LO#5- Explain the principle of sectioning and understand the intersection LO#6- Learning the main idea from assembly and detail drawing
Indicative Contents المحتويات الإرشادية	Indicative content includes the following:- Introduction / drawing instruments, Lettering / title block, Type of lines, Geometric Constructions, Geometric Shapes Orthographic projection on three perpendicular planes, isometric projection ,sectional view, Dimensioning

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The student work will be assessed according to the module tasks. The excises in the drawing hall will be marked weekly. And the homework will be assessed next lecture. During both assessments the student will give the oral and written feedback in order to improve their skills. An exam will be conducted at each end of a topic and The final exam will be done at the end of the semester

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem)	86	**Unstructured SWL (h/w)**	0

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 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	How to use engineering tools and paper layout with an explanation of the types of engineering lines.
Week 2	Handwriting exercises
Week 3	Engineering Processes
Week 4	Engineering Processes
Week 5	Engineering Processes
Week 6	Projection
Week 7	Projection
Week 8	**Mid-term Exam**
Week 9	Projection
Week 10	dimensions
Week 11	Isometric projection

Week 12	Isometric projection
Week 13	Isometric projection
Week 14	Isometric projection
Week 15	Monthly exam2
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	None
Week 2	None
Week 3	None
Week 4	None
Week 5	None
Week 6	None
Week 7	None

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**الرسم الهندسي / عبد الرسول عبد الحسين الخفاف**	Yes
Recommended Texts		
Websites		

SEMESTER THREE

1. SE 211

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">MATHEMATICS/ III</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">BASIC LEARNING ACTIVITIES</td><td colspan="2" rowspan="6">☒ Theory
☒ Lecture
☐ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE211</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SSWL (hr/sem)</td><td colspan="3">66</td></tr>
<tr><td>USSWL (hr/sem)</td><td colspan="3">64</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">130</td></tr>
<tr><td>Module Level</td><td colspan="2">2</td><td colspan="2">Semester of Delivery</td><td>1</td></tr>
<tr><td>Administering Department</td><td colspan="2">CED</td><td>College</td><td colspan="2">Type College Code</td></tr>
<tr><td>Module Leader</td><td colspan="2"></td><td>e-mail</td><td colspan="2"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td colspan="2">Prof.</td><td colspan="2">Module Leader’s Qualification</td><td>Ph.D.</td></tr>
<tr><td>Module Tutor</td><td colspan="2"></td><td>e-mail</td><td colspan="2"></td></tr>
<tr><td>Peer Reviewer Name</td><td colspan="2"></td><td>e-mail</td><td colspan="2"></td></tr>
<tr><td>Scientific Committee Approval Date</td><td colspan="2">14/06/2023</td><td>Version Number</td><td colspan="2">1.0</td></tr>
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<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>SE111 and SE121</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td></td><td>Semester</td><td></td></tr>
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Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	a- Introduce basic definitions and introductory concepts of mathematics b- Understand branches of mathematics you will encounter such as geometry or calculus or teach specific topics such as differential equations, algorithms, or non-linear geometry. mathematics courses are very beneficial for students of engineering that will require the extensive use of applied mathematics.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	9. Graphing all types of functions by polar coordinates. 10. .How to Find the area in polar coordinates 11. Use the vectors to Find equation of lines, planes 12. Use vector function to define the velocity, acceleration, curvature and the torsion 13. Graphing the surface. 14. Definition of function of two or more variables 15. Discussing and solving the applications of partial derivatives. 16. Describing the transcendental functions including their derivatives, applications and graphs. 17. Describing the directional derivatives and applications.
Indicative Contents المحتويات الإرشادية	<u>Part A – Polar Coordinates</u> Introduction definition of polar coordinates ,functions And transform the coordinates (Cartesian to polar) (4 hrs.) <u>Part B – Graph Functions</u> Graphing all types of curves in polar. [8 hrs.] <u>Part C – the aera</u> Find The area inside the curves and between them. [8 hrs.] <u>Part D – Function of two or more variables</u> Definitions, types and partial derivatives of functions and graph the surface and applications. [10 hrs.] <u>Part E – Application of partial derivatives</u> Directional derivatives and extreme values . [10 hrs.] <u>Part F—vectors</u> Definitions, operations, applications (12 hrs.) <u>Part G—vector Functions</u> Velocity , acceleration, curvature and the torsion [10 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

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

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	66	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**130**		

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 – polar coordinates.
Week 2	Equivalent equation of functions, Symmetry.
Week 3	Graphing the curves in polar.
Week 4	Find the area inside and between the curves.

Week 5	The vectors.
Week 6	Scalar and vector product.
Week 7	Mid-term Exam
Week 8	Vector functions.
Week 9	Equation of lines and planes.
Week 10	Function of two or more variables.
Week 11	Partial derivatives.
Week 12	Derivatives and graph the functions of surface.
Week 13	Directional derivatives.
Week 14	Applications.
Week 15	Extreme values .
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	-------------

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Thomas' Calculus, Early Transcendentals by George B. Thomas	Yes
Recommended Texts	Calculus by Howard Anton	No
Websites	------	

2. SE 212

Module Information معلومات المادة الدراسية				
Module Title	**ADVANCED SURVEYING**		**Module Delivery**	
Module Type	**CORE**		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**SE 212**			
ECTS Credits	**6**			
SWL (hr/sem)	**75**			
Module Level 2			**Semester of Delivery**	4
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader			**e-mail**	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	
Module Tutor			**e-mail**	E-mail
Peer Reviewer Name	Name		**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The important sciences in the science of geomatics engineering, whether in the theoretical or applied aspects of determining the ground control points .Surveying can be defined as: the science of locating points on or near the Earth's surface. This requires measuring distances and angles and representing the measurement values on paper in the form of a map, section, or graph. * Ground survey: It includes all types of flat areas 1. The curriculum studies the main topics of modern equipment in surveying engineering 2. How to monitor using Digital Level and correct measurements 3. How to monitor distances using electronic devices(EDM) 4. Using the Total stations device in ground survey operations 5. Developing skills in training on modern devices in the labor market 6. Reducing errors that occur during field monitoring operations

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Advanced scanning using modern equipment 2- The use of digital leveling in field monitoring 3- Reducing errors in differential digital settlement work 4- Accurate leveling in observing the vertical inclination of concrete structures 5- Electronic distance measure (EDM) 6- Introduction to the total station 7- Front crossover at corners using total lift station 8- Rear intersect with corners using total lift station 9- Total Station App (Area Measurement building height measurement) 10- Topographic and confined survey 11- Correct the locations of the measured points 12- Topographic and confined survey
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The first part of the course Students are instructed on the types of errors and how to correct them. The second part of the course The second stage students are trained on how to monitor using modern scanning devices The third part of the course How to use the total station to monitor the dams and cut-out facilities and produce maps using specialized software. Fourth part of the course How to analyze and classify results using specialized software.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Write something like: The main strategy that will be adopted in introducing this unit is to encourage students to participate in the exercises, while at the same time improving and extending their critical thinking skills. This will be achieved through classes and interactive tutorials and by looking at simple types of experiments that include some example activities. It measures distances and angles, measures coordinates, and produces maps. It represents measurement values on paper in the form of a map, section or graph. * The use of event devices in the ground survey for the sake of map results and the calculation of ground coordinates.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	40	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem)	35	**Unstructured SWL (h/w)**	3

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

Module Evaluation تقييم المادة الدراسية					
		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	/	10% (10)		
	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 advanced scanning using modern equipment
Week 2	Introduction to digital leveling
Week 3	Sources of errors in differential digital settlement work
Week 4	Accurate leveling in observing the vertical inclination of concrete structures
Week 5	Introduction to Distance Measurement
Week 6	Electronic Distance Measurement (EDM)
Week 7	Principles of Electronic Distance Measurement
Week 8	Introduction to total station
Week 9	The frontal intersection at the corners using the total station
Week 10	The rear intersection with corners using total station
Week 11	Application of Total Station device(• Area measurement • Building height measurement)
Week 12	Topographic and stake-out survey
Week 13	Correct the locations of the measured points

Week 14	Topographic and stake-out survey
Week 15	Correction of the cross-diagonal quadrilateral
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1,2,3,4	Level device ☐ Introduction to leveling process ☐ Two peg Test method (Device inspection for calibration) ☐ Review of differential levelling ☐ Permissible misclosure in levelling
Week 5,6,7	Total station device ☐ An introduction to how the device works ☐ How set the configuration of device ☐ Method of set the device in the field
Week 8,9	Application of Total Station device
Week 10	☐ Area measurement
Week 11,12	☐ Building height measurement
Week 13,	☐ Topographic and stake-out survey
Week 14,15	☐ Training on creating and correcting polygons using total station observations.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Adjustment models and computational geophysics. (2019) Adjustment computations , (2006) Surveying II , Chandra A.M. (2005) Plane surveying Mikhail E.M.and Glone,J.C.(2000),	Yes
Recommended Texts	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	No
Websites	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	

3. GE 04

Module Information معلومات المادة الدراسية				
Module Title	ENGLISH LANGUAGE II		**Module Delivery**	
Module Type	CORE		☒ **Theory** **Lecture** **Lab** ☐ **Tutorial** **Practical** ☐ **Seminar**	
Module Code	GE 04			
ECTS Credits	3			
SWL (h/sem)	75			
Module Level	3		**Semester of Delivery**	
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader	Asst. Prof Dr. Fanar M. Abed		**e-mail**	Fanar.mansour@coeng.uobaghdad.edu.iq
Module Leader's Acad. Title	Asst. Prof.		**Module Leader's Qualification**	PhD in Spatial Engineering from UK
Module Tutor	Name (if available)		**e-mail**	E-mail
Peer Reviewer Name	Name		**e-mail**	E-mail
Scientific Committee Approval Date			**Version Number**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**EnE 108 English**	**Semester**	2
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	5- The aim of this course is to empower students with the language and life skills 6- The integrated skills approach of the course develops the student's self-confidence 3- succeed in professional and social encounters within an English-speaking global co 4- using language to express knowledge of Environment and health impacts hazardou

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A1) FIND AND UNDERSTAND INFORMATION ABOUT VOCABULARY, PRONUNCIATION, USAGE, AND GRAMMAR IN REFERENCE TEXTS, ONLINE RESOURCES, AND ENGLISH LANGUAGE DICTIONARIES, (A2) DEVELOP CONVERSATIONAL ENGLISH SKILLS NECESSARY FOR BECOMING A CONTRIBUTING PARTICIPANT IN SMALL GROUP ACTIVITIES, LARGE GROUP DISCUSSIONS, AND ORAL PRESENTATIONS, (A3) UNDERSTAND TEXTS USING EFFECTIVE LEARNING STRATEGIES FOR READING AND VOCABULARY BUILDING,
Indicative Contents المحتويات الإرشادية	Speaking, reading and writing

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lecture and classroom discussion

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem):33 الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w):75** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem):42 الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w):14** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem):164 الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	20% (20)	5, 10	1,2
	Assignments	2	10% (10)	2, 12	3,1
	Projects / Lab.	0	0	0	0
	Essay	1	10% (10)	13	3,1
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	1,2
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unit 1,2
Week 2	Unit 3,4
Week 3	Unit 5,6
Week 4	Unit 7
Week 5	Unit 8
Week 6	Unit 9
Week 7	Unit 10,11
Week 8	Unit 12,13
Week 9	Unit 14
Week 10	Essay Writing
Week 11	General discussion
Week 12	English for Specific Purposes
Week 13	English for Specific Purposes
Week 14	English for Specific Purposes
Week 15	English for Specific Purposes
Week 16	**General discussions**

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

Week 7	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	(1) New Headway Plus [Pre-intermediate] by John and Liz Soars, Oxford: Oxford University Press (2006), (2) Modern scientific articles from the news related to the students' specialty, and (3) Internet links and videos related to the topics discussed in General English and English for Specific Purposes lectures. .	No
Recommended Texts	Morphy,A.J (1983) English Grammar in use. Cambridge:CUP	No
Websites	https://yoast.com/the-passive-voice-what-is-it-and-how-to-avoid-it/ https://www.ego4u.com/en/cram-up/grammar/passive https://en.wikipedia.org/wiki/English_passive_voice https://www.grammarly.com/blog/verb-tenses/?gclid=CjwKCAiAgc-ABhA7EiwAjev-j8Z8k1bheBN1ntkPThBC2aHSpRd_W9bqT5Q7ER	

SEMESTER FOUR

1. SE 221

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">MATHEMATICS/ IV</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">BASIC LEARNING ACTIVITIES</td><td colspan="2" rowspan="6">☒ Theory
☒ Lecture
☐ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE221</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SSWL (hr/sem)</td><td colspan="3">64</td></tr>
<tr><td>USSWL (hr/sem)</td><td colspan="3">66</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">130</td></tr>
<tr><td>Module Level</td><td>2</td><td colspan="2">Semester of Delivery</td><td colspan="2">2</td></tr>
<tr><td>Administering Department</td><td>CED</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Prof.
Asst. Prof.</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">Ph.D.
Ph.D..</td></tr>
<tr><td>Module Tutor</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Peer Reviewer Name</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Scientific Committee Approval Date</td><td>14/06/2023</td><td colspan="2">Version Number</td><td colspan="2">1.0</td></tr>
<tr><td colspan="6">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td colspan="2">SE111, SE121 and SE211</td><td>Semester</td><td colspan="2"></td></tr>
<tr><td colspan="6">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td colspan="5">a-Introduce basic definitions and introductory concepts of mathematics
b-Understand branches of mathematics you will encounter such as geometry or calculus or teach specific topics such as differential equations, algorithms, or non-linear geometry. Mathematics courses are very beneficial for students of engineering that will require the extensive use of applied mathematics.</td></tr>
<tr><td>Module Learning Outcomes</td><td colspan="5">18. Double integrals
19. The area</td></tr>
</table>

<table>
<tr><td>مخرجات التعلم للمادة الدراسية</td><td colspan="5">20. Double integral in polar
21. Triple integrals
22. Sequence and series
23. Testing for convergent and divergent
24. Type of series
25. Power series applications
26. Taylar series and application
27. Differential eqyations(first and second order)</td></tr>
<tr><td>Indicative Contents
المحتويات الإرشادية</td><td colspan="5">28. Part A – Double integrals
Diffenition of double integral (4 hrs.)
Part B – area
The area by using double integral . [8 hrs.]

Part C – double integral in polar coordinates
Find The area inside the curves and between them. [8 hrs.]

Part D – sequence and series
Definitions, types of series. [10 hrs.]

Part E – power series
Application of power series . [10 hrs.]
Part F—differential equations
Solve of first and second order (22 hrs.)</td></tr>
<tr><td colspan="6">Learning and Teaching Strategies
استراتيجيات التعلم والتعليم</td></tr>
<tr><td>Strategies</td><td colspan="5">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.</td></tr>
<tr><td colspan="6">Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا</td></tr>
<tr><td>Structured SWL (h/sem)
الحمل الدراسي المنتظم للطالب خلال الفصل</td><td>64</td><td colspan="3">Structured SWL (h/w)
الحمل الدراسي المنتظم للطالب أسبوعيا</td><td>4</td></tr>
<tr><td>Unstructured SWL (h/sem)
الحمل الدراسي غير المنتظم للطالب خلال الفصل</td><td>66</td><td colspan="3">Unstructured SWL (h/w)
الحمل الدراسي غير المنتظم للطالب أسبوعيا</td><td>4</td></tr>
<tr><td>Total SWL (h/sem)
الحمل الدراسي الكلي للطالب خلال الفصل</td><td colspan="5">130</td></tr>
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<table>
<tr><td colspan="6">تقييم المادة الدراسية</td></tr>
<tr><td colspan="2"></td><td>Time/Number</td><td>Weight (Marks)</td><td>Week Due</td><td>Relevant Learning Outcome</td></tr>
<tr><td rowspan="2">Formative assessment</td><td>Quizzes</td><td>2</td><td>10% (10)</td><td>5 and 10</td><td>LO #1, #2 and #10, #11</td></tr>
<tr><td>Assignments</td><td>2</td><td>10% (10)</td><td>2 and 12</td><td>LO #3, #4 and #6, #7</td></tr>
</table>

	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 – double integrals
Week 2	double integrals in rectangular region
Week 3	The area between curves.
Week 4	double integrals in polar
Week 5	Triple integrals
Week 6	Sequence and series
Week 7	Mid-term Exam
Week 8	Test for convergence and divergent
Week 9	Power series
Week 10	applications
Week 11	Type of Differential equation
Week 12	First order
Week 13	Second order
Week 14	Applications.
Week 15	Extreme values .
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	-------------

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Thomas' Calculus, Early Transcendentals by George B. Thomas	Yes
Recommended Texts	Calculus by Howard Anton	No
Websites	------	

2. SE 222

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">GEOMATICS NETWORKS</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">CORE</td><td colspan="2" rowspan="4">☒ Theory
☒ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE 222</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">75</td></tr>
<tr><td>Module Level</td><td></td><td colspan="2">Semester of Delivery</td><td colspan="2">3</td></tr>
<tr><td>Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Assistant Professor</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2"></td></tr>
<tr><td>Module Tutor</td><td></td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td>Version Number</td><td colspan="3">1.0</td></tr>
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<table>
<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td>Surveying can be defined as: the science of locating points on or near the earth's surface. This requires measuring distances and angles and representing the measurement values on paper in the form of a map, section, or graph. * Ground survey: It includes all types of flat area, in which the convexity of the earth's surface is neglected, i.e. it is considered a flat surface.
1. The curriculum studies the main topics of geodetic networks in surveying engineering
2. How to initial design geodetic networks
3. How to classify geodesy for the first, second, third and fourth degrees
4. Geodetic networks analysis and classification according to engineering specifications
5. Developing skills in training on modern devices in the labor market
6. Reducing errors that occur during field monitoring operations</td></tr>
<tr><td>Module Learning Outcomes</td><td>1. Introduction to advanced survey (accurate measurements and devices)
Basic information about advanced scanning, management and organization of business</td></tr>
</table>

مخرجات التعلم للمادة الدراسية	2. Errors in measurements and their propagation 3. Distance Measurement 4. Triangulation networks and the purpose of triangulation 5. Detection of errors used statistics 6. degrees of triangulation 7. Geometric shapes in triangulation 8. STRENGTH OF FIGURE 9. Calculate strength of shapes 10. Installation of control points and use of towers 12. Hunt first in building networks 13. Determine the base line 14.Base line correction 15. Precise measurement of angle
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The first part of the course Students are directed about the types of errors and how to correct them. The second part of the course The second stage students are trained on how to monitor using modern surveying equipment The third part of the course How to design geodetic networks from maps and project them on the ground using specialized programs. The fourth part of the course How to analyze and classify geodetic networks using specialized software.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	Write something like: The main strategy that will be adopted in introducing this unit is to encourage students to participate in the exercises, while at the same time improving and extending their critical thinking skills. This will be achieved through interactive classes and tutorials and by looking at simple types of experiments that include some example activities. It measures distances and angles and represents measurement values on paper in the form of a map, section, or graph. * Ground survey: It includes all types of flat areas in which the curvature of the earth's surface is neglected, i.e. it is considered a flat surface.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	40	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	/	10% (10)		
	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 advanced survey (accurate measurements and devices)
Week 2	Basic information about advanced scanning, management and organization of business
Week 3	Errors in measurements and their propagation
Week 4	Distance Measurement
Week 5	Triangulation networks and the purpose of triangulation
Week 6	Detection of errors used statistics
Week 7	degrees of triangulation
Week 8	Geometric shapes in triangulation
Week 9	STRENGTH OF FIGURE
Week 10	Calculate strength of shapes
Week 11	Installation of control points and use of towers
Week 12	Hunt first in building networks
Week 13	Determine the base line
Week 14	Base line correction
Week 15	Precise measurement of angle
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1,2,3	Reviewing 1 st stage devices (Theodolite) □ Determination the practical accuracy of theodolite T2 □ Determination of systematic error in Horizontal angle measurements

Week 4,5,6	Geodetic Networks Introduction of geodetic network (History, Types, Classifications) Horizontal Control Network
Week 7,8	Strength of Figure
Week 9,10	□ Determunation the probable error (in the last side and relative error (R.E) of the tringulation system
Week 11	□ primary suggestion of network _ part 1 (Training on designing geodetic networks using
Week 12,13,	Primary Suggestion of Network – Part 2 (Profiles to check inter-visibility & obstructions) □ Calculating the required height of towers & thickness of the target cylinder.
Week 14,15	Triangulation network adjustments □ Equal shift method

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Chandra A.M. (2005), SurveyingII, Plane surveying Mikhail E.M.and Glone,J.C.(2000),Adjustment computations Moffit 1987 (surveying) (المساحة المستوية) فوزي الخلصي)-,…	Yes
Recommended Texts	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	No
Websites	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	

4. SE 225

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="2">PRINCIPLES IN PHOTOGRAMMETRY</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">CORE</td><td colspan="3" rowspan="4">☒Theory
☒Lecture
☒Lab
☐Tutorial
☐Practical
☐Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">SE 225</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">3</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="2">60</td></tr>
<tr><td>Module Level</td><td>2</td><td colspan="2">Semester of Delivery</td><td colspan="2">4</td></tr>
<tr><td>Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Assistant Professor</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">MSc.</td></tr>
<tr><td>Module Tutor</td><td>Name (if available)</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td colspan="2">Version Number</td><td colspan="2">1.0</td></tr>
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<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td></td><td>Semester</td><td></td></tr>
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<tr><td colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td>1. This module aims to deepen the fundamental understanding of the mathematical principles of photogrammetry.
2. To develop problem solving skills in Photogrammetry through the application of techniques.
3. To understand how to apply photogrammetric solution in surveying problems.
4. This course deals with the basic concept of Photogrammetry
5. This module is the basic subject for all photogrammetric techniques.</td></tr>
</table>

	6. To understand all about photos, types of photos, error sources in image measurements.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this module, the learner will able to 1. Understand the meaning of Photogrammetry. 2. Describe the theoretical principles underpinning the use of photogrammetry. 3. Understand the various photogrammetric data. 4. List the various terms associated with photogrammetry. 5. Summarize what is meant by imaging devices. 6. Understand the geometry of vertical photographs. 7. Differentiate between the sources of errors in photo coordinates. 8. Identify the scale of photograph. 9. Differentiate between the systems of photo coordinates. 10. Determined the ground coordinates from photographs. 11. Understand the concept of relief displacement 12. Describe the systems of tilted photographs.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: Definition of Photogrammetry, History of Photogrammetry, Types of Photographs, Taking Vertical Aerial Photographs, Existing Aerial Photography. Uses of Photogrammetry. [4 hrs] Principles of Photography and Imaging Single-Lens Camera, Relationship of Aperture and Shutter Speed, Digital Images, Color Image Representation, Digital Image Display. [4 hrs] Cameras and Other Imaging Devices, Metric Cameras for Aerial Mapping, Focal Plane and Fiducial Marks, Digital Mapping . [8 hrs] Coordinate Systems for Image Measurements, Simple Scales for Photographic Measurements, Measuring Photo Coordinates with Simple Scales, Comparator: Measurement of Photo Coordinates, Photogrammetric Scanners, Refinement of Measured Image Coordinates, Distortions of Photographic Films and Papers, Image Plane Distortion, Reduction of Coordinates to an Origin at the Principal Point, Correction for Lens Distortions, Correction for Atmospheric Refraction, Correction for Earth Curvature. [12 hrs] Vertical Photographs Geometry of Vertical Photographs, Scale, Scale of a Vertical Photograph Over Flat Terrain, Scale of a Vertical Photograph Over Variable Terrain, Average Photo Scale, Other Methods of Determining Scale of Vertical Photographs, Ground Coordinates from a Vertical Photograph, Relief Displacement on a Vertical Photograph, Flying Height of a Vertical Photograph, Error Evaluation. [16 hrs] 2D Coordinate Transformations. [4 hrs] Tilted and Oblique Photographs Point Perspective, Angular Orientation in Tilt, Swing, and Azimuth. Auxiliary Tilted Photo Coordinate System, Scale of a Tilted Photograph. Relief Displacement on a Tilted Photograph. [8 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering 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	34	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	26	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**60**		

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-Definition of Photogrammetry, History of Photogrammetry, Types of Photographs, Uses of Photogrammetry.

Week 2	Principles of Photography and Imaging Single-Lens Camera, Relationship of Aperture and Shutter Speed.
Week 3	Cameras and Other Imaging Devices
Week 4	Digital Images, Color Image Representation, Digital Image Display.
Week 5	Image Measurements and Refinements- Coordinate Systems for Image Measurements
Week 6	Refinement of Measured Image Coordinates, Distortions of Photographic Films and Papers, Image Plane Distortion, Reduction of Coordinates to an Origin at the Principal Point.
Week 7	Correction for Lens Distortions, Atmospheric Refraction& Correction for Earth Curvature
Week 8	Mid-term Exam
Week 9	Vertical Photographs- Geometry of Vertical Photographs, , Average Photo Scale, Other Methods of Determining Scale of Vertical Photographs
Week 10	Scale- Scale of a Vertical Photograph Over Flat Terrain& Over Variable Terrain.
Week 11	Flying Height of a Vertical Photograph& Ground Coordinates from a Vertical Photograph
Week 12	Relief Displacement on a Vertical Photograph
Week 13	2D Coordinates Transformation
Week 14	Tilted and Oblique Photographs- Angular Orientation in Tilt, Swing, and Azimuth
Week 15	Auxiliary Tilted Photo Coordinate System, Scale & Relief Displacement on a Tilted Photograph
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to Photogrammetry
Week 2	Lab 2: reading the information in photographs (hard copy)
Week 3	Lab 3: Interpretation of photographs
Week 4	Lab 4: Reading digital images
Week 5	Lab 5: Convert coordinates systems for image measurements to the principle point system
Week 6	Lab 6: Measured image coordinates
Week 7	Lab 7: Applications on image measurements and refinement
Week 8	Mid-term Exam
Week 9	Lab 8: Determining scale of vertical photographs
Week 10	Lab 9: Determining scale of vertical photographs over variable terrain

Week 11	Lab 10: Flying height & ground coordinates from of vertical photographs
Week 12	Lab 11: Applications of Relief Displacement on a Vertical Photograph
Week 13	Lab 12: Using MATLAB for 2D Coordinates Transformation I
Week 14	Lab 13: Using MATLAB for 2D Coordinates Transformation II
Week 15	Lab 14: Determining Scale & Relief Displacement on a Tilted Photograph
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elements of Photogrammetry with applications in GIS, Paul Wolf, 2016	Yes
Websites	https://www.pdfdrive.com/elements-of-photogrammetry-with-applications-in-gis-e177428392.html	

SEMESTER FIVE

1. SE 311

Module Information معلومات المادة الدراسية					
Module Title	**ENGINEERING ANALYSIS & NUMERICAL METHODS**		**Module Delivery**		
Module Type	**CORE LEARNING ACTIVITY**		☒ Theory ☒ Lecture ☐ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	**SE311**				
ECTS Credits	**4**				
SSWL (hr/sem)	52				
USSWL (hr/sem)	**48**				
SWL (hr/sem)	**100**				
Module Level	3		**Semester of Delivery**	5	
Administering Department	CED		**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title	Prof. Asst. Prof.		**Module Leader's Qualification**	Ph.D. Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date	14/06/2023		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	SE111, SE121, SE211 and SE221	**Semester**	
Co-requisites module		**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 a theoretical understanding of engineering analyses. 2. To understand differential equations more broadly. 3. This course deals with the basic concepts of engineering analytics.

	4. Solve complex problems. 5. To understand the problems of engineering applications laws. 6. To perform a mathematical analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	10. Ordinary Differential Equation 1st Order. 11. Separable. 12. Homogeneous. 13. Linear. 14. Exact. 15. Bernoulli. 16. Ordinary Differential Equation 2nd Order. 17. Ordinary Differential Equation 3rd Order. 18. Applications. 19. Fourier Serious 20. Simultaneous Differential Equations
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A **Introduction** (preview on the sign convention of Differential Equation). [4 hrs] Part B **First order D.E.** (Explain and solve the all-mathematical problems)**.** [4 hrs] Part C **Ordinary Differential Equation 1st Order**. [4 hrs] Part D **Ordinary Differential Equation 2nd Order**. [6 hrs] Part E **Ordinary Differential Equation 3rd Order**. [4 hrs] Part F **Applications** [10 hrs] **Fourier Serious** [8 hrs] **Simultaneous Differential Equations** [12 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main adopted strategy in delivering this module, encourage students' participation in the exercises, refining and expanding their critical thinking skills comprised: 1. Lectures. 2. Tutorials. 3. Homework and Assignments. 4. Tests and Exams. 5. In-Class Questions and Discussions. 6. Connection between Theory and Application. 7. Extracurricular Activities. 8. In- and Out-Class oral conservations.

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

Structured SWL (h/sem)	52	**Structured SWL (h/w)**	4

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	48	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	6	10% (10)	3,5,7,10, 13 and 15	LO #1&2, #4, #3, #5, #6 and #6
	Assignments	6	5% (10)	3,5,7,10, 13 and 15	LO #1&2, #4, #3, #5, #6 and #6
	Projects / Lab.	--	--	…	---
	Report	--	--	--	---
Summative assessment	**Midterm Exam**	2hr	15% (10)	8	LO #1 - #4
	Final Exam	3hr	70% (70)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Ordinary Differential Equation 1st Order
Week 2	Separable
Week 3	Homogeneous
Week 4	Linear
Week 5	Exact
Week 6	Bernoulli
Week 7	Mid-term Exam
Week 8	Ordinary Differential Equation 2nd Order
Week 9	Ordinary Differential Equation 3rd Order
Week 10	Applications of 1st order
Week 11	Applications of 2nd order
Week 12	Fourier Serious
Week 13	Fourier Serious
Week 14	Simultaneous Differential Equations

Week 15	Simultaneous Differential Equations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	-------

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Chapra, Steven C, and Canale, Raymond P (2009). Numerical Methods for Engineering. McGraw Hill, New York.	Yes
Recommended Texts	- Al-Khafaji, A. W. and Tooly, J. R. (1986). Numerical Methods in Engineering Practice. Holt, Rinehart and Winston, New York. - Gerald, C. F. and Wheatley, P. O. (2004). Applied Numerical Analysis. Addison Wesley Reading, MA. - Kreyszig, E. (1999). Advanced Engineering Mathematics. John Wily & Sons. New York. - Chapra, Steven. (2011). Applied Numerical Methods with MATLAB for Engineering and	No

2. SE 312

<table>
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معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">ENGINEERING PHOTOGRAMMETRY</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">CORE</td><td colspan="2" rowspan="4">☒ Theory
☒ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE 312</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">150</td></tr>
<tr><td>Module Level</td><td>3</td><td colspan="2">Semester of Delivery</td><td colspan="2">5</td></tr>
<tr><td>Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Lecture</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">MSc.</td></tr>
<tr><td>Module Tutor</td><td>Name (if available)</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td>Version Number</td><td colspan="3">1.0</td></tr>
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<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td>The course aims to: -
1. Extract surveying information from single aerial photos.
2. Extract surveying information from stereo aerial photos.
3. To introduce basics and concepts of photogrammetric, aerial photography and mapping from aerial photographs using different types of stereo plotters
4. Photo interpretation for use in environmental monitoring, and measurements of structural parameters.
5. To understand principles of photogrammetric measurements.
6. Determining the correct position and orientation of each image in a series of aerial images so they can be compiled into a map.</td></tr>
<tr><td>Module Learning Outcomes</td><td>1. Student will be able to distinguish identifies, define, formulate, and solve photogrammetry problems by applying principles of photogrammetry, science and</td></tr>
</table>

مخرجات التعلم للمادة الدراسية	mathematics. 2. The ability to take accurate and precise measurements that meet the specific requirements of different photogrammetry aspects with quality assurance, analyze and interpret results. 3. Student will be able to work adequately on teams and to set up objectives, plan activities, meet due dates.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. **Stereoscopic Viewing (36 hr)** Introduction, Depth Perception, The Human Eye, Stereoscopic Depth Perception,Viewing Photographs Stereoscopically, Stereoscopes, The Use of Stereoscopes, Causes of Y Parallax, Vertical Exaggeration in Stereoviewing 2. **Stereoscopic Parallax (18 hr)** Photographic Flight-Line Axes for Parallax Measurement, Monoscopic Methods of Parallax Measurement, Principle of the Floating Mark, Stereoscopic Methods of Parallax Measurement, Parallax Equations, Elevations by Parallax Differences, Simplified Equation for Heights of Objects from Parallax Differences, Measurement of Parallax Differences, Computing Flying Height and Air Base, Error Evaluation 3. **Planimetric Mapping for GIS (72 hr)** Planimetric Mapping, Georeferencing of Digital Imagery, Photomaps, Mosaics, Uncontrolled Digital Mosaics, Semicontrolled Digital Mosaics, Controlled Digital Mosaics, Angular Orientation in Omega-Phi-Kappa, Determining the Elements of Exterior Orientation, Rectification of Tilted Photographs, Correction for Relief of Ground Control Points Used in Rectification, Analytical Rectification, Digital Rectification **4. Projection/Analogue Stereoplotters (9 hr)** Stereoscopic Plotting Instruments, Classification of Stereoscopic Plotters, Projection Systems, Viewing and Tracing Systems, Interior Orientation, Relative Orientation, Absolute Orientation **(3+12 hr) Final Exam**

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation 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+ 3 final Exam
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4 +12 final Exam
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	20% (20)	4 and 12	LO #1, #2
	Assignments	/	/	/	
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #3
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1, #2
	Final Exam	3hr	50% (50)	16	LO #1, #2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Stereoscopic Viewing
Week 2	Depth Perception ,The Human Eye, Stereoscopic Depth Perception
Week 3	Viewing Photographs Stereoscopically, Stereoscopes ,The Use of Stereoscopes
Week 4	Causes of *Y* Parallax, Vertical Exaggeration in Stereo viewing + Quiz 1
Week 5	Stereoscopic Parallax
Week 6	Planimetric Mapping for GIS ,Planimetric Mapping, Georeferencing of Digital Imagery
Week 7	Photomaps, Mosaics
Week 8	Mid Exam
Week 9	Uncontrolled Digital Mosaics
Week 10	Semicontrolled Digital Mosaics
Week 11	Controlled Digital Mosaics
Week 12	Angular Orientation in Omega-Phi-Kappa, Determining the Elements of Exterior Orientation, Rectification of Tilted Photographs + Quiz 2
Week 13	Correction for Relief of Ground Control Points Used in Rectification, Analytical Rectification
Week 14	Digital Rectification
Week 15	Projection/Analogue Stereo plotters Stereoscopic Plotting Instruments, Classification of Stereoscopic Plotters, Projection Systems, Viewing and Tracing Systems, Interior Orientation, Relative Orientation, Absolute Orientation

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Practical Side of Stereoscopic Viewing
Week 2	Practical Side of Depth Perception ,The Human Eye, Stereoscopic Depth Perception
Week 3	Practical Side of Viewing Photographs Stereoscopically, Stereoscopes ,The Use of Stereoscopes
Week 4	Practical Side of Causes of Y Parallax, Vertical Exaggeration in Stereo viewing
Week 5	Practical Side of Stereoscopic Parallax
Week 6	Practical Side of Planimetric Mapping for GIS ,Planimetric Mapping, Georeferencing of Digital Imagery
Week 7	Practical Side of Photomaps, Mosaics
Week 8	////
Week 9	Practical Side of Uncontrolled Digital Mosaics
Week 10	Practical Side of Semicontrolled Digital Mosaics
Week 11	Practical Side of Controlled Digital Mosaics
Week 12	Practical Side of Angular Orientation in Omega-Phi-Kappa, Determining the Elements of Exterior Orientation, Rectification of Tilted Photographs
Week 13	Practical Side of Correction for Relief of Ground Control Points Used in Rectification, Analytical Rectification
Week 14	Practical Side of Digital Rectification
Week 15	Practical Side of Projection/Analogue Stereo plotters Stereoscopic Plotting Instruments, Classification of Stereoscopic Plotters, Projection Systems, Viewing and Tracing Systems, Interior Orientation, Relative Orientation, Absolute Orientation

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Elements of Photogrammetry with applications in GIS, Paul Wolf, 2016	Yes
Recommended Texts	كتاب المسح التصويري التحليلي , بشار سليم , فنار منصور , ميثم مطشر, 2009.	Yes
Websites	https://www.pdfdrive.com/elements-of-photogrammetry-with-applications-in-gis-e177428392.html	

4. SE 313

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">ENGINEERING SURVEY</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">CORE</td><td colspan="2" rowspan="4">☒ Theory
☒ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE 313</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">150</td></tr>
<tr><td>Module Level</td><td>3</td><td colspan="2">Semester of Delivery</td><td colspan="2">5</td></tr>
<tr><td>Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Lecture</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">MSc.</td></tr>
<tr><td>Module Tutor</td><td>Name (if available)</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td colspan="2">Version Number</td><td colspan="2">1.0</td></tr>
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<table>
<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
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<table>
<tr><td colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td>7. The course aims to introduce the Engineering Surveying applications and to give student a practical turning to manage a survey project.
8. The course aims to provide you with the theoretical knowledge and practical skills necessary to manage the responsibilities of supervising all work related to engineering surveying.
9. To plan, implement and follow up most of the engineering projects related to the earth's surfaceA broad education and knowledge of contemporary issues necessary to understand the impact of surveying engineering solutions in a global context.</td></tr>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td>5. Student will be able to distinguish identifies, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.
6. Student will be able to to take accurate and precise measurements that meet the specific requirements of different engineering aspects with quality assurance, analyze</td></tr>
</table>

	and interpret results 7. Student will be able to skillfully communicate the results of surveying procedures through different surveying techniques using both oral and written skills
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Leveling (45 hr) 2. Measure & compute area (54 hr) 3. Volume (36) (3+12) Final Exam

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation 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 +3 final Exam
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4 +12 final Exam
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	introduction
Week 2	Leveling (method of leveling)
Week 3	Applications of leveling(profile& cross section)
Week 4	Tachometry + Quiz 1
Week 5	Leveling with tachometry procedure & compute coordinates
Week 6	Measure & compute area in field part 1
Week 7	Measure & compute area in field part 2
Week 8	Mid Exam
Week 9	Measure & compute area from map
Week 10	Compute area of cross sections part 1
Week 11	Compute area of cross sections part 2
Week 12	Compute volumes of uniform figures+ Quiz 2
Week 13	Compute volumes of cut & fill
Week 14	Volume of borrow bit
Week 15	Volume from Contours

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: levelling 1
Week 2	Lab 2: Levelling (method of levelling) 2
Week 3	Lab 3: Applications of levelling(profile& cross section)
Week 4	Lab 4: Tachometry
Week 5	Lab 5: Levelling with tachometry procedure & compute coordinates
Week 6	Lab 6: Measure & compute area in field part 1
Week 7	Lab 7: Measure & compute area in field part 2
Week 8	Mid exam
Week 9	Lab 8: Measure & compute area from map
Week 10	Lab 9: Compute area of cross sections part 1
Week 11	Lab 10: Compute area of cross sections part 2
Week 12	Lab 11: Compute volumes of uniform figures

Week 13	Lab 12: Compute volumes of cut & fill
Week 14	Lab 13: Volume of borrow bit
Week 15	Lab 14: Volume from Contours

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	المساحة المستوية – الاستاذ فوزي الخالصي -	Yes
Recommended Texts	المسح الهندسي والكادسترائي زياد عبد الجبار البكر تموز 1989م	Yes
Websites		

4. GE 05

Module Information معلومات المادة الدراسية			
Module Title	ENGLISH LANGUAGE		**Module Delivery**
Module Type	**S**		☒ **Theory** **Lecture** **Lab** ☐ **Tutorial** **Practical** ☐ **Seminar**
Module Code	GE 05		
ECTS Credits	3		
SWL (h/sem)	75		
Module Level	5	**Semester of Delivery**	
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**EnE 108 English** **EnE 211 English**	**Semester**	2 3
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	9- The aim of this course is to empower students with the language and life skills 10- The integrated skills approach of the course develops the student's self-confidence 3- succeed in professional and social encounters within an English-speaking global co 4- using language to express knowledge of Environment and health impacts hazardou

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A1) FIND AND UNDERSTAND INFORMATION ABOUT VOCABULARY, PRONUNCIATION, USAGE, AND GRAMMAR IN REFERENCE TEXTS, ONLINE RESOURCES, AND ENGLISH LANGUAGE DICTIONARIES, (A2) DEVELOP CONVERSATIONAL ENGLISH SKILLS NECESSARY FOR BECOMING A CONTRIBUTING PARTICIPANT IN SMALL GROUP ACTIVITIES, LARGE GROUP DISCUSSIONS, AND ORAL PRESENTATIONS, (A3) UNDERSTAND TEXTS USING EFFECTIVE LEARNING STRATEGIES FOR READING AND VOCABULARY BUILDING,
Indicative Contents المحتويات الإرشادية	Speaking, reading and writing

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Lecture and classroom discussion

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

Structured SWL (h/sem):33 الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w):75** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem):42 الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w):14** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem):164 الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	20% (20)	5, 10	1,2
	Assignments	2	10% (10)	2, 12	3,1
	Projects / Lab.	0	0	0	0
	Essay	1	10% (10)	13	3,1
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	1,2
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Unit 1,2
Week 2	Unit 3,4
Week 3	Unit 5,6
Week 4	Unit 7
Week 5	Unit 8
Week 6	Unit 9
Week 7	Unit 10
Week 8	Unit 11
Week 9	Unit 12
Week 10	Essay Writing
Week 11	General discussion
Week 12	English for Specific Purposes
Week 13	English for Specific Purposes
Week 14	English for Specific Purposes
Week 15	English for Specific Purposes
Week 16	**General discussions**

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

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	(4) New Headway Plus [Intermediate] by Liz and John Soars, Oxford: Oxford University Press (2006), (5) Modern scientific articles from the news related to the students' specialty, and (6) Internet links and videos related to the topics discussed in General English and English for Specific Purposes lectures.	No
Recommended Texts	Morphy, A.J (1983) English Grammar in use. Cambridge: CUP	No
Websites	https://www.internationalstudent.com/essay_writing/essay_tips/ https://owl.purdue.edu/owl/general_writing/academic_writing/essay_writing/index.html https://www.ukessays.com/guides/how-to-write-an-essay.php https://www.grammarly.com/blog/verb-tenses/	

5. SE 314

Module Information معلومات المادة الدراسية		
Module Title	**COMPUTATION ADJUSTMENT I**	**Module Delivery**
Module Type	**CORE**	☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar
Module Code	**SE 314**	
ECTS Credits	**6**	
SWL (hr/sem)	**75**	

Module Level	3	**Semester of Delivery**	5
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Surveying I and Surveying II	**Semester**	
Co-requisites module	Geometric matrices, Matlab	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	Computation Adjustment I and error theory are among the basic sciences in the field of surveying engineering. Any engineering project must have a known accuracy and confidence in measurements. Therefore, this course aims to clarify these topics in detail. 1. In geomatics, different kinds of measurements are applied. The imperfections in instrumentation, weather conditions, and limitations of the operator's skills produce field observations that encompass different kinds of errors. Accord- ingly, understanding the adjustment of observations and theory of errors are essential to process and solve problems 2. Because we need confidence in applied engineering or a scientific project, statistical measures of accuracy, precision, and reliability should be computed and/or standardized. 3. The least squares adjustment technique of observations is powerful in the sense of post analysis and the accuracy measures that can be estimated after adjustment. Further, it is suitable to be programmed and then productized or added to other programming software

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Because we need confidence in applied engineering or a scientific project, statistical measures of accuracy, precision, and reliability should be computed and/or standardized. 1. Accord- ingly, understanding the adjustment of observations and theory of errors are essential to process and solve geomatical problems. 2. The imperfections in instrumentation, weather conditions, and limitations of the operator's skills produce field observations that encompass different kinds of errors. 3. Because we need confidence in applied engineering or a scientific project, statistical measures of accuracy, precision, and reliability should be computed and/or standardized. 4. It should be noted that fulfilling the required accuracy stan- dards will take more time to implement, more professional labor, advanced instrumentation, and more computing power.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The first part of the course Students are instructed on the types of errors and how to correct them. The second part of the course Third stage students are trained on how to derive engineering equations, handle observational errors, and obtain accurate results The third part of the course Solving complex problems using specialized programs such as the use of matrices or the theory of least squares. Fourth part of the course This will be achieved through classes and interactive tutorials and by looking at simple types of experiments that include some example activities. An example of measuring and correcting distances, angles and coordinates in field observations in the ground survey, aerial survey and other observations
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Write something like: The main strategy that will be adopted in introducing this unit is to encourage students to participate in the exercises, while at the same time improving and extending their critical thinking skills. This will be achieved through classes and interactive tutorials and by looking at simple types of experiments that include some example activities. An example of measuring and correcting distances, angles and coordinates in field observations in the ground survey, aerial survey and other observations

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	40	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
	Quizzes	2	10% (10)	5 and 10	LO #1, #2 and #10, #11

Formative assessment	Assignments	/	10% (10)		
	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	statistical Introduction.
Week 2	statistical Definitions and Terminologies(Normal Distribution Cure.)
Week 3	Applications: statistical Definitions and Terminologies (Normal Distribution Cure.)
Week 4	The probable Error and Levels of Rejection
Week 5	Introduction propagation of Errors
Week 6	Using Matrix form for propagation of Errors.
Week 7	Preanalysis of Errors
Week 8	Applications propagation of errors I
Week 9	Applications propagation of errors II
Week 10	**Exam**
Week 11	Introduction least squares Adjustment procedures.
Week 12	Adjustment by observation Equation Method
Week 13	Applications Adjustment by condition Equation Method
Week 14	Adjustment by observation Equation Method
Week 15	Applications Adjustment by condition Equation Method
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1,2,3	Applications: The probable Error and Levels of Rejection
Week 4,5,6	Applications: propagation of errors
Week 7,8	Applications: Matrix form for propagation of Errors.
Week 9	Exam
Week 10,11,12	Applications Adjustment by observation Equation Method
Week 13,14	Adjustment by condition equalization method

Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Adjustment models and computational geophysics. (2019) Computations adjustment and practice. Bashar , 2010 Adjustment computations , (2006) Surveying II , Chandra A.M. (2005)	Yes
Recommended Texts	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	No
Websites	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	

SEMESTER SIX

1. SE 326

Module Information معلومات المادة الدراسية				
Module Title	AUTOCAD CIVIL 3D		Module Delivery	
Module Type	CORE		☒Theory ☒Lecture ☒Lab ☐Tutorial ☐Practical ☐Seminar	
Module Code	SE 326			
ECTS Credits				
SWL (hr/sem)				
Module Level			Semester of Delivery	
Administering Department	Type Dept. Code		College	Type College Code
Module Leader			e-mail	
Module Leader's Acad. Title	Assistant Professor		Module Leader's Qualification	MSC
Module Tutor	Name (if available)		e-mail	E-mail
Peer Reviewer Name	Name		e-mail	E-mail
Scientific Committee Approval Date	01/06/2023		Version Number	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Familiarize students with the CAD Civil 3D environment: ● Explain the user interface and key tools in the software. ● Introduce navigation and basic operations within the CAD Civil 3D environment. 2. Provide an introduction to the principles of drawing in CAD: ● Explain fundamental concepts such as layers, linetypes, and colors. ● Teach students how to create and modify basic geometric shapes using CAD tools. 3. Teach students how to design and draw a house map in CAD: ● Introduce the process of creating a house map, including setting up the drawing scale.

	● Guide students through the creation of walls, doors, windows, and other architectural elements using CAD tools. 4. Provide tutorials for house map design and drawing: ● Offer step-by-step instructions and hands-on exercises to reinforce the concepts taught. ● Cover additional aspects such as adding dimensions, annotations, and hatching to the house map. 5. Introduce the basics of Civil 3D: ● Explain the purpose and capabilities of Civil 3D in civil engineering and land development projects. ● Familiarize students with the key features and functions of Civil 3D. 6. Cover advanced topics related to Civil 3D: ● Explain how to prepare drawing sheet settings for professional documentation. ● Teach students how to import points, transform coordinates, and create surfaces and contour lines from the point data. ● Introduce the definition and application of main road elements, horizontal and vertical curves, profiles, and cross sections. ● Explain the concept of corridors and their elements in Civil 3D. ● Demonstrate methods for computing volumes and calculating areas. ● Provide examples and exercises for road design, volume calculations, and area division with different shapes
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understand the CAD Civil 3D environment: Students will gain an overview of the CAD Civil 3D software environment, becoming familiar with its interface and tools. 2. Grasp the principles of drawing in CAD: Students will learn the fundamental principles and techniques of creating drawings using CAD software, including precision, scale, layers, and annotations. 3. Design and draw a house map in CAD: Students will be able to create a house map using CAD software, incorporating elements such as walls, doors, windows, and other architectural components. 4. Perform tutorials for house map design and drawing: Students will engage in practical exercises and tutorials to enhance their proficiency in designing and drawing house maps in CAD. 5. Introduction to Civil 3D: Students will be introduced to the specific features and functionalities of Civil 3D, a specialized CAD software for civil engineering and infrastructure design. 6. Prepare drawing sheet settings: Students will learn how to set up drawing sheets properly, including page size, title blocks, borders, and other necessary components for professional drawings. 7. Import points and coordinate transformation: Students will acquire the skills to import data points from external sources and perform coordinate transformations to align them within the CAD environment. 8. Create surfaces and contour lines from points: Students will be able to generate digital surfaces and contour lines based on imported points, enabling them to visualize and analyze terrain features. 9. Define main road elements, horizontal, and vertical curves: Students will gain an understanding of the key components and design considerations for roads, including horizontal alignments, vertical alignments, and curve design. 10. Overview of profiles and cross-sections: Students will learn how to create profiles and cross-sections, which provide detailed views of the terrain and road design along specific alignments. 11. Define corridor elements: Students will become familiar with the concept of corridors in Civil 3D, allowing them to model and design roads, highways, and other linear

	infrastructure elements. 12. Compute volumes: Students will learn various methods for calculating volumes, such as cut and fill computations, which are essential for earthwork calculations in construction and infrastructure projects. 13. Compute area and land division methods: Students will gain the ability to calculate areas of land parcels and apply different methods for dividing land, such as lot subdivision and boundary determination. 14. Examples of road design and volume computations: Students will study practical examples of road design projects, including the computation of earthwork volumes, providing them with real-world applications of the learned concepts. 15. Examples of area division with different shapes: Students will explore examples of dividing land areas with different shapes, helping them develop skills in determining boundary lines and partitioning land parcels effectively.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Working with Points,editing Point, and Exporting and Importing Points [2 weeks] Working with Surfaces. Adding to Surfaces, Editing Surfaces, Exporting & Sharing Surfaces Alignments,. Creating Alignments, Alignment Labeling, Working with Profile, Editing Profiles, Profile Labels, Working with Assemblies and Subassemblies [3 weeks] Working with Corridors, Creating Corridors, Corridor Attributes, . Corridors Editing d. Corridor Analysis [2 weeks] Working with Volume computations and analysis, Working with Volume computations and analysis, Working with land division tools Working with land division using Parcels tool, Project to divide areas with different shapes.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Active Learning: This approach encourages learners to actively engage in the learning process through activities such as discussions, problem-solving, group work, and hands-on experiments. It promotes critical thinking, collaboration, and retention of information. Inquiry-Based Learning: In this strategy, learners are presented with open-ended questions or problems to investigate and explore. They develop their understanding and knowledge through research, experimentation, and analysis, fostering curiosity, problem-solving skills, and independent thinking. Collaborative Learning: This strategy emphasizes group work and cooperation among learners. It promotes communication, teamwork, and the sharing of ideas and knowledge. Collaborative learning can involve activities such as group projects, discussions, and peer teaching. Flipped Classroom: In a flipped classroom model, learners study the material independently outside of class, typically through pre-recorded lectures or online resources. Class time is then used for discussions, problem-solving, and clarification of concepts, allowing for more interactive and personalized learning experiences. Visual Aids and Multimedia: Incorporating visual aids, such as diagrams, charts, and videos, can enhance understanding and retention of information. Multimedia tools and technologies can be used to present content in an engaging and interactive manner, catering to different learning preferences.. Feedback and Assessment: Providing timely and constructive feedback is crucial for effective learning. It helps learners understand their strengths and areas for improvement. Various assessment methods, including formative assessments (e.g., quizzes, discussions) and

	assessments (e.g., exams, projects), can be used to evaluate learning progress and provide feedback.

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

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

Module Evaluation
تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Overview of cad civil 3d environment**
Week 2	**Introduction to principles of drawing in CAD**
Week 3	**Introduction to design and draw a house map in CAD**
Week 4	**Tutorials for a house map (design and draw)**
Week 5	**Introduction to civil 3d**
Week 6	**Prepare the drawing sheet setting**
Week 7	**Importing points and coordinate transform**
Week 8	**create surface and contour lines from points**
Week 9	**Definition of the main road elements,horizontal and vertical curves**

Week 10	**Overview of Profiles and cross sections**
Week 11	**Definition of the Corridors elements**
Week 12	**volumes computation methods**
Week 13	**compute area and Land division methods**
Week 14	**Examples for road design and computations volume**
Week 15	**Examples for dividing area with different shapes**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Working with Points a. Working with Points b. Editing Point c. Exporting and Importing Points
Week 2	Working with Surfaces a. Working with Surfaces b. Adding to Surfaces c. Editing Surfaces d. Exporting & Sharing Surfaces
Week 3	Alignments a. Creating Alignments b. Alignment Labeling
Week 4	Working with Profiles a. Working with Profiles b. Editing Profiles c. Profile Labels
Week 5	Working with Assemblies and Subassemblies a. Working with Assemblies and Subassemblies b. Subassemblies
Week 6	Working with Corridors a. Creating Corridors b. Corridor Attributes c. Corridors Editing d. Corridor Analysis
Week 7	Working with Volume computations and analysis
Week 8	Working with Volume computations and analysis
Week 9	Working with land division tools

Week 10	Working with land division using Parcels tool
Week 11	Project to divide areas with different shapes
Week 12	Working with survey tool
Week 13	Working with survey tool
Week 14	Working with survey tool
Week 15	Project to import and drawing points (individual and continuous objects) by survey tools

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts	1. Bacci, G., Falletti, E., Fernández-Prades, C., Luise, M., Margaria, D. & Zanier, F. 2011. Chapter 2 - Satellite-Based Navigation Systems. Satellite and Terrestrial Radio Positioning Techniques. Oxford: Academic Press. 2. H. Bernhard, L. Herbert, and W. Elmar (2010) "GNSS - Global Navigation Satellite Systems: GPS, GLONASS, Galileo, & more", Spring Wien New York, Austria. 3. Kaplan, E. D. & Hegarty, C. J. (2006), "Understanding GPS: Principles and Applications", 2nd Edition, ARTECH HOUSE, Boston, London.	No
Websites		

2. SE 321

<table>
<tr><td colspan="6">Module Information
معلومات المادة الدراسية</td></tr>
<tr><td>Module Title</td><td colspan="3">APPLIED PHOTOGRAMMETRY</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">CORE</td><td colspan="2" rowspan="4">☒ Theory
☒ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE 321</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">150</td></tr>
<tr><td>Module Level</td><td>3</td><td colspan="2">Semester of Delivery</td><td colspan="2">6</td></tr>
<tr><td>Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Lecture</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">MSc.</td></tr>
<tr><td>Module Tutor</td><td>Name (if available)</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td>Version Number</td><td colspan="3">1.0</td></tr>
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<table>
<tr><td colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</td></tr>
<tr><td>Prerequisite module</td><td>None</td><td>Semester</td><td></td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

<table>
<tr><td colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</td></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td>The course aims to: -
1. To introduce basics and concepts of photogrammetric, aerial photography and mapping from aerial photographs using different types of software.
2. On successful completion of this course, students will be able to: Demonstrate the understanding of properties and characteristics of aerial photographs. Illustrate the various types of Photogrammetric techniques and measurements Demonstrate knowledge and understanding of Digital Photogrammetry.</td></tr>
<tr><td>Module Learning Outcomes
مخرجات التعلم للمادة الدراسية</td><td>1. An ability to produce 3D model that meet desired needs within certain constraints by applying both analysis and synthesis in the photogrammetry process. This is achieved by theoretical and practical knowledge of photogrammetry procedures.
2. Student will be able to skillfully communicate the results of surveying procedures through different photogrammetry techniques, maps and plans for positioning using both oral and written communication skills.</td></tr>
</table>

	student will be able to work adequately on teams and to set up objectives, plan activities, meet due dates
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. **Analytical Photogrammetry (72 hr)** Introduction, Image Measurements, Control Points, Collinearity Condition, Development of Collinearity Condition Equations, Single Photo Resection and orientation (SPRO), Space Resection by Collinearity, Space Intersection by Collinearity, Analytical Stereomodel, Analytical Interior Orientation, Analytical Relative Orientation, Analytical Absolute Orientation, 3D Object Space Coordinate Systems and transformation, analytical plotters, softcopy/digital plotters **Aerotriangulation (63)** Introduction, Pass Points for Aerotriangulation, Sequential Construction of a Strip Model from Independent Models, Adjustment of a Strip Model to Ground, Simultaneous Bundle Adjustment, Initial Approximations for the Bundle Adjustment, Bundle Adjustment with Airborne GPS Control, Interpretation of Bundle Adjustment Results **(3+12) Final Exam**

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation 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+ 3 final Exam
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4 +12 final Exam
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation
تقييم المادة الدراسية

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

	Report	1	10% (10)	13	LO #3
Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1, #2
	Final Exam	3hr	50% (50)	16	LO #1, #2
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction Analytical Photogrammetry
Week 2	Image Measurements ,Control Points, Collinearity Condition
Week 3	Development of Collinearity Condition Equations
Week 4	Single Photo Resection and orientation (SPRO) I,II + Quiz
Week 5	Single Photo Resection and orientation (SPRO) III,IV
Week 6	Space Resection by Collinearity, Space Intersection by Collinearity, Analytical Stereomodel
Week 7	Analytical Interior Orientation, Analytical Relative Orientation, Analytical Absolute Orientation
Week 8	Mid Exam
Week 9	3D Object Space Coordinate Systems and transformation,
Week 10	analytical plotters, softcopy/digital plotters
Week 11	Introduction, Pass Points for Aerotriangulation
Week 12	Sequential Construction of a Strip Model from Independent Models + Quiz
Week 13	Adjustment of a Strip Model to Ground, Simultaneous Bundle Adjustment
Week 14	Initial Approximations for the Bundle Adjustment
Week 15	Bundle Adjustment with Airborne GPS Control, Interpretation of Bundle Adjustment Results

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Practical side of Analytical Photogrammetry
Week 2	Practical side of Image Measurements ,Control Points, Collinearity Condition
Week 3	Practical side of Development of Collinearity Condition Equations
Week 4	Practical side of Single Photo Resection and orientation (SPRO) I,II
Week 5	Practical side of Single Photo Resection and orientation (SPRO) III,IV
Week 6	Practical side of Space Resection by Collinearity, Space Intersection by Collinearity, Analytical Stereomodel
Week 7	Practical side of Analytical Interior Orientation, Analytical Relative Orientation, Analytical Orientation
Week 8	Mid term exam
Week 9	Practical side of 3D Object Space Coordinate Systems and transformation,
Week 10	Practical side of analytical plotters, softcopy/digital plotters

Week 11	Practical side of Pass Points for Aerotriangulation
Week 12	Practical side of Sequential Construction of a Strip Model from Independent Models
Week 13	Practical side of Adjustment of a Strip Model to Ground, Simultaneous Bundle Adjustment
Week 14	Practical side of Initial Approximations for the Bundle Adjustment
Week 15	Practical side of Bundle Adjustment with Airborne GPS Control, Interpretation of Bundle Adjustment Results

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elements of Photogrammetry with applications in GIS, Paul Wolf, 2016	Yes
Recommended Texts	كتاب المسح التصويري التحليلي , بشار سليم , فنار منصور , ميثم مطشر, 2009.	Yes
Websites	https://www.pdfdrive.com/elements-of-photogrammetry-with-applications-in-gis-e177428392.html	

1. SE 324

Module Information معلومات المادة الدراسية				
Module Title	**ROUTE SURVEYING**		**Module Delivery**	
Module Type	**CORE**		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	**SE 324**			
ECTS Credits	**6**			
SWL (hr/sem)	**150**			
Module Level	3		**Semester of Delivery**	6
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader			**e-mail**	
Module Leader's Acad. Title	Lecture		**Module Leader's Qualification**	MSc.
Module Tutor	Name (if available)		**e-mail**	E-mail
Peer Reviewer Name	Name		**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. The course aims to introduce the Route Surveying applications and to give student a practical turning to manage a survey project. 2.The course aims to provide you with the theoretical knowledge and practical skills necessary to manage the responsibilities of supervising all work related to route surveying. 3..To plan, implement and follow up most of the engineering projects related to the route engineering.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Student will be able to distinguish identifies, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics. Student will be able to to take accurate and precise measurements that meet the specific requirements of different engineering aspects with quality assurance, analyze and interpret results Student will be able to skillfully communicate the results of surveying procedures through different surveying techniques using both oral and written communication skills.

Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Vertical curves (45 hr) 2. Horizontal curves (54 hr) 3. Methods of setting- out (18 hr) 4. Spiral curves (18 hr)

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering 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 +3 final Exam
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4 +12 final Exam
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

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

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Vertical curves
Week 2	Compute level of points on vertical curves part 1
Week 3	Compute level of points on vertical curves part 2 + Quiz

Week 4	Function of vertical curves
Week 5	Unsymmetrical vertical curves
Week 6	Horizontal curves
Week 7	Types of horizontal curves
Week 8	Mid Exam
Week 9	Methods of setting- out a simple circular curves
Week 10	Tangential angles method
Week 11	Compute coordinates of the curves
Week 12	Reveres circular curves + Quiz
Week 13	Compound circular curves
Week 14	Spiral curves
Week 15	Clothoid curve

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Vertical curves
Week 2	Lab 2: Compute level of points on vertical curves part 1
Week 3	Lab 3: Compute level of points on vertical curves part 2
Week 4	Lab 4: Function of vertical curves
Week 5	Lab 5: Unsymmetrical vertical curves
Week 6	Lab 6: Horizontal curves
Week 7	Lab 7: Types of horizontal curves
Week 8	Mid term
Week 9	Lab 8: Methods of setting- out a simple circular curves
Week 10	Lab 9: Tangential angles method
Week 11	Lab 10: Compute coordinates of the curves
Week 12	Lab 11: Reveres circular curves
Week 13	Lab 12: Compound circular curves
Week 14	Lab 13: Spiral curves
Week 15	Lab 14: Clothoid curve

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	المساحة المستوية – الاستاذ فوزي الخالصي -	Yes
Recommended Texts	المسح الهندسي والكادسترائي زياد عبد الجبار البكر تموز 1989م	Yes
Websites		

5. SE 323

Module Information
معلومات المادة الدراسية

Module Title	**COMPUTATION ADJUSTMENT II**	**Module Delivery**	
Module Type	**CORE**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**SE 323**		
ECTS Credits	**6**		
SWL (hr/sem)	**75**		

Module Level	3	**Semester of Delivery**	6
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Assistant Professor	**Module Leader's Qualification**	
Module Tutor		**e-mail**	
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Surveying I and Surveying II and Matlab , Matrix	**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	Computation Adjustment I and error theory are among the basic sciences in the field of surveying engineering. Any engineering project must have a known accuracy and confidence in measurements. Therefore, this course aims to clarify these topics in detail. 1. In geomatics, different kinds of measurements are applied. The imperfections in instrumentation, weather conditions, and limitations of the operator's skills produce field observations that encompass different kinds of errors. Accord- ingly, understanding the adjustment of observations and theory of errors are essential to process and solve problems 2. Because we need confidence in applied engineering or a scientific project, statistical measures of accuracy, precision, and reliability should be computed and/or standardized.

	3. The least squares adjustment technique of observations is powerful in the sense of post analysis and the accuracy measures that can be estimated after adjustment. Further, it is suitable to be programmed and then productized or added to other programming software tools.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Because we need confidence in applied engineering or a scientific project, statistical measures of accuracy, precision, and reliability should be computed and/or standardized. 1. Accord- ingly, understanding the adjustment of observations and theory of errors are essential to process and solve geomatical problems. 2. The imperfections in instrumentation, weather conditions, and limitations of the operator's skills produce field observations that encompass different kinds of errors. 3. Because we need confidence in applied engineering or a scientific project, statistical measures of accuracy, precision, and reliability should be computed and/or standardized. 4. It should be noted that fulfilling the required accuracy stan- dards will take more time to implement, more professional labor, advanced instrumentation, and more computing power.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The first part of the course Students are instructed on the types of errors and how to correct them. The second part of the course Third stage students are trained on how to derive engineering equations, handle observational errors, and obtain accurate results The third part of the course Solving complex problems using specialized programs such as the use of matrices or the theory of least squares. Fourth part of the course This will be achieved through classes and interactive tutorials and by looking at simple types of experiments that include some example activities. An example of measuring and correcting distances, angles and coordinates in field observations in the ground survey, aerial survey and other observations

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Write something like: The main strategy that will be adopted in introducing this unit is to encourage students to participate in the exercises, while at the same time improving and extending their critical thinking skills. This will be achieved through classes and interactive tutorials and by looking at simple types of experiments that include some example activities. An example of measuring and correcting distances, angles and coordinates in field observations in the ground survey, aerial survey and other observations

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	40	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	/	10% (10)		
	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 the covariance matrix and its applications.
Week 2	Ellipse of Errors
Week 3	Relative ellipse curve
Week 4	Observation models in two dimension (2D by distances)
Week 5	Intersection by Azimuth
Week 6	Intersection by angles
Week 7	*The problem of Resection & least square*
Week 8	Correction Of Complex Triangulation Networks With Lengths And Angles (Hybrid)
Week 9	*Adjustment of Trilateration Networks*
Week 10	*Adjustment of Combined Triangulation*
Week 11	Exam
Week 12	Adjustment with constraints
Week 13	Correction by internal parameters (free network adjustment)
Week 14	Observation model in photogrammetry
Week 15	*Three dimensional intersections by distances*
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1,2,	Applications: Ellipse of Errors
Week 4,5,6	Applications Intersection by (distance and Azimuth and angles)

Week 7,8	Applications: *The problem of Resection & least square*
Week 9	Exam
Week 10,11,12	*Application :Adjustment of Trilateration Networks*
Week 13,14	*Application :Adjustment of Combined Triangulation*
Week 15	Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Adjustment models and computational geophysics. (2019) Computations adjustment and practice. Bashar , 2010 Adjustment computations , (2006) Surveying II , Chandra A.M. (2005)	Yes
Recommended Texts	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	No
Websites	https://fac.ksu.edu.sa/sites/default/files/surveying https://dokumen.tips/engineering/surveying-proble	

SEMESTER SEVEN

1. GE 06

Module Information معلومات المادة الدراسية			
Module Title	ENGLISH LANGUAGE IV		**Module Delivery**
Module Type	S		☒ **Theory** **Lecture** **Lab** ☐ **Tutorial** **Practical** ☐ **Seminar**
Module Code			
ECTS Credits	3		
SWL (h/sem)	75		

Module Level	8	**Semester of Delivery**	
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Asst. Prof.	**Module Leader's Qualification**	
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date		**Version Number**	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**EnE 108 English** **EnE 211 English** **EnE 309 English**	**Semester**	2 3 5
Co-requisites module	none	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	13- The aim of this course is to empower students with the language and life skills 14- The integrated skills approach of the course develops the student's self-confidence 3- succeed in professional and social encounters within an English-speaking global co 4- using language to express knowledge of Environment and health impacts hazardou

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	A1) FIND AND UNDERSTAND INFORMATION ABOUT VOCABULARY, PRONUNCIATION, USAGE, AND GRAMMAR IN REFERENCE TEXTS, ONLINE RESOURCES, AND ENGLISH LANGUAGE DICTIONARIES, (A2) DEVELOP CONVERSATIONAL ENGLISH SKILLS NECESSARY FOR BECOMING A CONTRIBUTING PARTICIPANT IN SMALL GROUP ACTIVITIES, LARGE GROUP DISCUSSIONS, AND ORAL PRESENTATIONS, (A3) UNDERSTAND TEXTS USING EFFECTIVE LEARNING STRATEGIES FOR READING AND VOCABULARY BUILDING,
Indicative Contents المحتويات الإرشادية	Speaking, reading and writing

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Lecture and classroom discussion

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

Structured SWL (h/sem) :33 الحمل الدراسي المنتظم للطالب خلال الفصل		**Structured SWL (h/w): 75** الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem): 42 الحمل الدراسي غير المنتظم للطالب خلال الفصل		**Unstructured SWL (h/w): 14** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem):164 الحمل الدراسي الكلي للطالب خلال الفصل			

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	20% (20)	5, 10	1,2
	Assignments	2	10% (10)	2, 12	3,1
	Projects / Lab.	0	0	0	0
	Essay	1	10% (10)	13	3,1
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	1,2
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Unit 1,2
Week 2	Unit 3,4
Week 3	Unit 5,6
Week 4	Unit 7
Week 5	Unit 8
Week 6	Unit 9
Week 7	Unit 10
Week 8	Unit 11
Week 9	Unit 12
Week 10	Essay Writing
Week 11	General discussion
Week 12	English for Specific Purposes
Week 13	English for Specific Purposes
Week 14	English for Specific Purposes
Week 15	English for Specific Purposes
Week 16	**General discussions**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	New Headway Plus [Upper-intermediate] by Liz and John Soars, Oxford: Oxford University Press (2006), Modern scientific articles from the news related to the students' specialty, and Internet links and videos related to the topics discussed in General English and English for Specific Purposes lectures.	No
Recommended Texts	Morphy, A.J (1983) English Grammar in use.	No
Websites	https://www.ef.com/wwen/english-resources/english-grammar/tense-changes-when-using-reported-speech/ https://www.perfect-english-grammar.com/reported-speech.html https://learningenglish.voanews.com/a/everyday-grammar-reported-speech/2856671.html https://learnenglish.britishcouncil.org/grammar/intermediate-to-upper-intermediate/reported-speech-1-statements	

2. SE 412

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="2">ENGINEERING CLOSE RANGE PHOTOGRAMMETRY</td><td colspan="3">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="2">CORE</td><td colspan="3" rowspan="4">☒ Theory
☒ Lecture
☒ Lab
☐ Tutorial
☐ Practical
☐ Seminar</td></tr>
<tr><td>Module Code</td><td colspan="2">SE 412</td></tr>
<tr><td>ECTS Credits</td><td colspan="2">6</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="2">150</td></tr>
<tr><td colspan="2">Module Level</td><td>4</td><td colspan="2">Semester of Delivery</td><td>7</td></tr>
<tr><td colspan="2">Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="2">Type College Code</td></tr>
<tr><td>Module Leader</td><td colspan="2"></td><td>e-mail</td><td colspan="2"></td></tr>
<tr><td colspan="2">Module Leader’s Acad. Title</td><td>Assistant Professor</td><td colspan="2">Module Leader’s Qualification</td><td>Ph.D.</td></tr>
<tr><td>Module Tutor</td><td colspan="2">Name (if available)</td><td>e-mail</td><td colspan="2">E-mail</td></tr>
<tr><td colspan="2">Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="2">E-mail</td></tr>
<tr><td colspan="2">Scientific Committee Approval Date</td><td>01/06/2023</td><td colspan="2">Version Number</td><td>1.0</td></tr>
</table>

<table>
<tr><th colspan="4">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td>Engineering Photogrammetry
Applied Photogrammetry</td><td>Semester</td><td>5 & 6</td></tr>
<tr><td>Co-requisites module</td><td>None</td><td>Semester</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.
1. Recognize how close-range photogrammetric projects works in multiple applications.
2. List the various terms associated with terrestrial close-range photogrammetry.
3. Summarize what terrestrial cameras, settings, camera calibration meant.
4. Discuss the reaction and involvement of CRP images with ground objects.
5. Describe mathematical solutions including traditional and CV.
6. Define self-calibration, quality assurance, and data analysis.
7. Identify error sources and optimization.
8. Discuss the operations of project planning, data acquisition considerations, and control for CRP projects.</td></tr>
</table>

	9. Discuss the various properties of ground objects and how this can affect accuracy and precision measurements. 10. Explain DSM and DTM extraction and main data sources. 11. Identify interpolation methods including meshing and TIN data networking. 12. Applications and real case studies simulation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - CRP Introduction to terrestrial photogrammetry and CRP, applications, camera types, camera settings, camera calibration, self-calibration, Collinearity equations. [15 hrs] Ground targeting, artificial targets, coded targets, distribution and location of control targets, horizontal and vertical control. [15 hrs] Project planning preparation, photo capture cases, B/H ratio considerations, camera setting recommendations and considerations. [15 hrs] DLT solution, initial approximations to E.O.Ps, LS solution, control assumption, planning and data acquisition planning . [15 hrs] Part B – Computer Vision CRP Photogrammetry Computer vision CV photogrammetry, 3D point cloud generation via structure-from-motion (SfM) approaches, principals, SfM based UAV for CRP applications. [15 hrs] Data integration and data fusion approaches. [10 hrs] Digital Terrain Modelling (DTM, DEM, DHM, DTEM) concepts and their implementation and applications in geomatics engineering, Models of DTM (Grids, Contours, and TINS), data structures (Delaunay triangulation, Voronoi diagram, Octree, k-D tree) processing (filtering, random sample consensus, surface normal computation), surface representation from point data using moving averages, linear projection, and Kriging techniques. [15 hrs] Grid resampling methods and search algorithms used in gridding and interpolation. DTM derivatives (slope maps, aspect maps, viewsheds, and watershed). Applications of DTM in volume computation, and others. [15 hrs]
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in this course is to encourage students' participation both in theoretic and the exercise materials, while at the same time refining and expanding their critical thinking skills regarding this CV technology. This will be achieved through classes, interactive tutorials, field practical sessions, and by considering types of lab training and data processing experiments involving some sampling application case studies 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	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية						
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	/	/		
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction - Basics principals of CRP, past vs current, data acquisition, metric and non-metric cameras, CRP solution concepts, advantages and drawbacks, methodology pipeline
Week 2	Project planning, data acquisition, data preparation and orientation, idealization of data processing
Week 3	Project planning steps in details, GSD computation, B/H ratio settings, exposure triangle
Week 4	Image acquisition strategies, stereo and convergent strategies, image and control acquisition
Week 5	Processing and block triangulation, exporting derivable, How to solve CRP problem?
Week 6	Project planning tips, which camera to use and other considerations
Week 7	Camera calibration, calibration modules, camera calibration solutions
Week 8	Analytical self-calibration, self-calibration solution, linearization and initial approximation of EOPs
Week 9	DLT solution, concepts, procedures, deriving camera parameters, DLT advantages
Week 10	CV photogrammetry, SfM algorithms, 3D point cloud generation via structure-from-motion approaches
Week 11	Data integration and fusion, concepts, methods and approaches
Week 12	Digital Terrain Modelling (DTM, DEM, DHM, DTEM) concepts, mathematical techniques used in the acquisition processing, storage, manipulation, and applications of DTM. Models of DTM (Grids, Contours)
Week 13	Processing (filtering, random sample consensus, surface normal computation), surface representation from point data using moving averages, linear projection, and Kriging techniques
Week 14	Grid resampling methods and search algorithms used in gridding and interpolation
Week 15	Applications in SfM CRP and DTM of multiple real case studies
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to CRP photogrammetry
Week 2	Lab 2: Camera parameters /training- day 1
Week 3	Lab 3: Camera parameters /training- day 2
Week 4	Lab 4: Field work – project planning
Week 5	Lab 5: Field work – target design
Week 6	Lab 6: Field work – target deployment
Week 7	Lab 7: Field work – control acquisition
Week 8	Lab 8: Field work – image acquisition
Week 9	Lab 9: Lab work – data visualization and filtering
Week 10	Lab 10: Lab work – data processing/ day 1
Week 11	Lab 11: Lab work – data processing/ day 2
Week 12	Lab 12: Lab work – data analyzing
Week 13	Lab 13: Lab work – data exporting and derivable

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Elements of Photogrammetry with applications in GIS, Paul Wolf, 2016	Yes
Recommended Texts	Photogrammetry- Geometry from images and laser scans, Karl Kraus, 2007.	Yes/ Online
Websites		

3. SE 413

<table>
<tr><th colspan="6">Module Information
معلومات المادة الدراسية</th></tr>
<tr><td>Module Title</td><td colspan="3">SATELLITE POSITIONING SYSTEMS I</td><td colspan="2">Module Delivery</td></tr>
<tr><td>Module Type</td><td colspan="3">CORE</td><td colspan="2" rowspan="4">☒Theory
☒Lecture
☒Lab
☐Tutorial
☒Practical
☐Seminar</td></tr>
<tr><td>Module Code</td><td colspan="3">SE413</td></tr>
<tr><td>ECTS Credits</td><td colspan="3">4</td></tr>
<tr><td>SWL (hr/sem)</td><td colspan="3">100</td></tr>
<tr><td>Module Level</td><td>4</td><td colspan="2">Semester of Delivery</td><td colspan="2">7</td></tr>
<tr><td>Administering Department</td><td>Type Dept. Code</td><td>College</td><td colspan="3">Type College Code</td></tr>
<tr><td>Module Leader</td><td></td><td>e-mail</td><td colspan="3"></td></tr>
<tr><td>Module Leader’s Acad. Title</td><td>Assistant Professor</td><td colspan="2">Module Leader’s Qualification</td><td colspan="2">MSC</td></tr>
<tr><td>Module Tutor</td><td>Name (if available)</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Peer Reviewer Name</td><td>Name</td><td>e-mail</td><td colspan="3">E-mail</td></tr>
<tr><td>Scientific Committee Approval Date</td><td>01/06/2023</td><td>Version Number</td><td colspan="3">1.0</td></tr>
<tr><th colspan="6">Relation with other Modules
العلاقة مع المواد الدراسية الأخرى</th></tr>
<tr><td>Prerequisite module</td><td colspan="2">None</td><td>Semester</td><td colspan="2"></td></tr>
<tr><td>Co-requisites module</td><td colspan="2">None</td><td>Semester</td><td colspan="2"></td></tr>
<tr><th colspan="6">Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية</th></tr>
<tr><td>Module Objectives
أهداف المادة الدراسية</td><td colspan="5">1. The course aims to give comprehensive information in all aspects of the subject of surveying with GNSS systems.
2. To understand principles, observation methods, data transfer , basic process.
3. This course aims to give basic information of GNSS segments, GNSS Signal structure
4. Basic concept of the GNSS receivers in terms of types, parts, and it is work.
5. Give principle of GNSS orbits types , Reference Coordinate Systems
6. To understanding Mathematical Models for Positioning by GNSS for each cases with specific configuration.</td></tr>
<tr><td>Module Learning Outcomes</td><td colspan="5">Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</td></tr>
</table>

مخرجات التعلم للمادة الدراسية	1. Explore the features, applications, and societal significance of GNSS in today's world. 2. Define various coordinate systems encountered by GNSS users, calculate GPS coordinates, and engage in a discussion about them. 3. Describe global satellite navigation systems, satellite orbital characteristics, and the structure of satellite signals. 4. Outline the fundamental characteristics of GPS/GNSS and trace their developmental history. 5. Discuss the principles of GNSS observations, conduct observations using a GNSS receiver, and analyze the collected data. 6. Explain different techniques employed in GNSS observations, calculate and evaluate the levels of accuracy associated with them. 7. Identify and discuss essential project planning considerations when utilizing GNSS, and outline the key steps involved in planning a GNSS data collection project for asset mapping. Explain the procedures involved in GNSS data collection and processing, including Differential GNSS techniques (code and phase), and assess the collected and processed data. 8. The students get basic techniques to perform plan and measurements by GNSS receivers based on receiver type and observation method requirement for specific project. 9. Represent GPS with other geospatial data on a map. 10. Apply GPS technologies to real world scenarios using an understanding of GPS theory and practices.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A - GNSS principle, segments and structure</u> Overview of GPS/ GNSS concept , Introduction to the satellite-based positioning systems ,GPS/GNSS segments. Overview of GNSS positioning system work in practical case and define the common terms used in practical GNSS survey. Overview of GNSS receiver types and comparison between them in terms of accuracy, cost, data results, and limitations …etc. present and describe each parts of grad survey GNSS receiver and explained how it is work (mechanical and physical) Theory and practical of GNSS receiver work,GPS/GNSS observable (Carrier phase vs code measurement),Pseudo-Random Noise (PRN) codes and modulation, Navigation Message (NAV)present manual of handheld GPS receiver and show how we can use the manual for observations (guide students for using the manual for training as self-learning) ,Field work for collecting data using handheld GNSS receiver and use all techniques that were learned from the handheld manual for create a way points and perform the stake out using compass with special technique, Transfer data (way points coordinates) from the handheld receiver using USB / Serial cable, and import it in Google earth map, and make a report included coordinates, distances, close errors, and accuracy), present manual of survey-grade GNSS receiver for define its parts and make a main configuration (like interval, mask angle, receiver antenna type, observation method, initialization time, coordinates system, precision, and ..etc) Introduction to basic concept of Satellite orbital motions,Types of satellite orbits (almanc, broadcast, and precise orbit), basic concept to configure geodesy GNSS receiver and make observations using static method. <u>Part B - GNSS mathematical and observation techniques</u> Reference Coordinate Systems (ECI, ECEF),Geodetic Datum (WGS 84, North American Datum 1983) International Terrestrial Reference Frames ITRF, field work for configure geodesy GNSS receiver and make observations using static method. [12]

	Observation Method teqhniches (single point positioning vs relative point positioning),Mathematical Models for Positioning by GNSS (code ranges using Static and RTK technique),Mathematical Models for Positioning by GNSS (carrier phase using Static and RTK technique) change the elements of configuration receiver and find the effect on horizontal and vertical accuracy. (like change cut angle, interval, epoch, initialization time, satellite system, frequency ...etc)determine different lengths ranging from .5 meter to 20 meter and observe them by GNSS receiver, feet bar, and Total Stations. Then compute the horizontal and vertical differences of different lengths resulted from above devices to determine the accuracy

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	Active Learning: This approach encourages learners to actively engage in the learning process through activities such as discussions, problem-solving, group work, and hands-on experiments. It promotes critical thinking, collaboration, and retention of information. Inquiry-Based Learning: In this strategy, learners are presented with open-ended questions or problems to investigate and explore. They develop their understanding and knowledge through research, experimentation, and analysis, fostering curiosity, problem-solving skills, and independent thinking. Collaborative Learning: This strategy emphasizes group work and cooperation among learners. It promotes communication, teamwork, and the sharing of ideas and knowledge. Collaborative learning can involve activities such as group projects, discussions, and peer teaching. Flipped Classroom: In a flipped classroom model, learners study the material independently outside of class, typically through pre-recorded lectures or online resources. Class time is then used for discussions, problem-solving, and clarification of concepts, allowing for more interactive and personalized learning experiences. Visual Aids and Multimedia: Incorporating visual aids, such as diagrams, charts, and videos, can enhance understanding and retention of information. Multimedia tools and technologies can be used to present content in an engaging and interactive manner, catering to different learning preferences.. Feedback and Assessment: Providing timely and constructive feedback is crucial for effective learning. It helps learners understand their strengths and areas for improvement. Various assessment methods, including formative assessments (e.g., quizzes, discussions) and assessments (e.g., exams, projects), can be used to evaluate learning progress and feedback.

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	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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 / 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 GPS/ GNSS concept
Week 2	Introduction to the satellite-based positioning systems
Week 3	GPS/GNSS segments
Week 4	Theory and practical of GNSS receiver work
Week 5	GPS/GNSS observable (Carrier phase vs code measurement)
Week 6	Pseudo-Random Noise (PRN) codes and modulation
Week 7	Navigation Message (NAV)
Week 8	Introduction to basic concept of Satellite orbital motions
Week 9	Types of satellite orbits (almanc, broadcast, and precise orbit)
Week 10	Reference Coordinate Systems (ECI, ECEF)
Week 11	Geodetic Datum (WGS 84, North American Datum 1983)
Week 12	International Terrestrial Reference Frames ITRF and comparison with other References

Week 13	**Observation Method techniques (single point positioning vs relative point positioning)**
Week 14	**Mathematical Models for Positioning by GNSS (code ranges using Static and RTK**
Week 15	**Mathematical Models for Positioning by GNSS (carrier phase using Static and RTK**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	1. Overview of GNSS positioning system work in practical case and define the common terms used in practical GNSS survey.
Week 2	2. Overview of GNSS receiver types and comparison between them in terms of accuracy, cost, data results, and limitations …etc.
Week 3	3. present and describe each parts of grad survey GNSS receiver and explained how it is work (mechanical and physical)
Week 4	4. present manual of handheld GPS receiver and show how we can use the manual for observations (guide students for using the manual for training as self-learning)
Week 5	5. Field work for collecting data using handheld GNSS receiver and use all techniques that were learned from the handheld manual for create a way points and perform the stake out using compass with special technique,
Week 6	6. Transfer data (way points coordinates) from the handheld receiver using USB / Serial cable, and import it in Google earth map, and make a report included coordinates, distances, close errors, and accuracy)
Week 7	7. Present manual of survey-grade GNSS receiver for define its parts and make a main configuration (like interval, mask angle, receiver antenna type, observation method, initialization time, coordinates system, precision,.etc)
Week 8	8. Field work for configure geodesy GNSS receiver and make observations using static method.
Week 9	9. Transfer data from the geodesy GNSS receiver using SD memory card and cable, and import data using commercial software belongs to manufacturer of the receiver (like Topcon link software), and process data (like Topcon tools software).
Week 10	10. Field work: GNSS receiver configuration (RTK setting) and make observations using local RTK method
Week 11	11. Transfer RTK file from the controller, and import data using commercial software (like Topcon link).
Week 12	12. Field work for accuracy assessment: change the elements of configuration receiver and find the effect on horizontal and vertical accuracy. (like change cut angle, interval, epoch, initialization time, satellite system, frequency ...etc)
Week 13	13. Field work for accuracy assessment: determine different lengths ranging from .5 meter to 20 meter and observe them by GNSS receiver, feet bar, and Total Stations. Then compute the horizontal and vertical differences of different lengths resulted from above devices to determine the accuracy.
Week 14	14. field work for accuracy assessment : determine different lengths ranging from .5 meter to 20 meter and observe them by GNSS receiver, feet bar, and Total Stations. Then

	compute the horizontal and vertical differences of different lengths resulted from above devices to determine the accuracy.
Week 15	15. Download observation files from Iraqi CORS using NGS services (User Friendly CORS), https://geodesy.noaa.gov/UFCORS/.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		Yes
Recommended Texts	4. Bacci, G., Falletti, E., Fernández-Prades, C., Luise, M., Margaria, D. & Zanier, F. 2011. Chapter 2 - Satellite-Based Navigation Systems. Satellite and Terrestrial Radio Positioning Techniques. Oxford: Academic Press. 5. H. Bernhard, L. Herbert, and W. Elmar (2010) "GNSS - Global Navigation Satellite Systems: GPS, GLONASS, Galileo, & more", Spring Wien New York, Austria. 6. Kaplan, E. D. & Hegarty, C. J. (2006), "Understanding GPS: Principles and Applications", 2nd Edition, ARTECH HOUSE, Boston, London.	No
Websites		

7. SE 414

Module Information
معلومات المادة الدراسية

Module Title	GEOSPATIAL INFORMATION SYSTEMS I	**Module Delivery**	
Module Type	**CORE**	☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	SE 414		
ECTS Credits	5		
SWL (hr/sem)	125		
Module Level	4	**Semester of Delivery**	7
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader		**e-mail**	
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

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

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

Module Objectives أهداف المادة الدراسية	• To understand Fundamentals of GIS. • To understand Spatial Data Modelling. • This course deals with the basic GIS Data Management. • This course deals with the Data Input and Editing. • To understand Data Quality Issues. • To know Sources of Error in GIS.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of weeks. • Recognize how GIS produce digital maps. • List the various terms associated with GIS. • Summarize what is meant by a basic digital maps. • Discuss the Data Input Methods and editing

	• Describe GIS Data File Management, Database Models, and Storage of GIS Data. • Identify the Graphic Representation of Spatial Data in GIS • Identify the basic of Theoretical Framework for GIS. • Discuss the Theoretical Models of GIS
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Fundamentals of GIS: Introduction, Roots of GIS, Overview of Information System, The Four Ms, Contribution Disciplines, GIS Definitions and Terminology, Geographical Entities, Attributes, Topology, Congnitive Models. [15 hrs] GIS Queries, GIS Architecture, Components of a GIS, GIS Work Flow, Theoretical Models of GIS, Functional Elements of GIS, Fundamental Operations of GIS, Theoretical Framework for GIS, GIS Categories, Levels/Scales of Measurement. [20 hrs] Spatial Data Modelling, Stages of GIS Data Modelling, Graphic Representation of Spatial Data, Raster Data Representation. [15 hrs]. Vector Data Representation, Spatial Data Models, Raster GIS Models, Simple Raster Arrays, Hierarchical Raster Structures, Types of Raster GIS Models, Compact Raster Data Models. Vector GIS Models, Spaghetti Model, Topological Models, Shape File, Compact Vector Data Models, Comparison of Raster and Vector Models. [15 hrs] Data Base Management Systems, Functions of DBMS, Components of DBMS, GIS Data File Management, Simple List, Ordered Sequential Files, Indexed Files. [15 hrs] Building GIS Worlds, Database Models, Hierarchical Database Models, Network Systems, Relational Database Models, Standard Query language (SQl). [15 hrs] Storage of GIS Data, The Hydrid Data Model, The Integrated Data Model Data Input and Editing, Data Input Methods, Keyboard Entry, Manual Digitizing, Scanning and Automatic Digitizing, Data Editing, Sources of Error in GIS, Modelling Errors in GIS. [15 hrs]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in this course is to encourage students' participation both in theoretic and the exercise materials, while at the same time refining and expanding their critical thinking skills regarding this outstanding new technology. This will be achieved through classes, interactive tutorials, field practical sessions, and by considering types of lab training and data processing experiments involving some sampling application case studies 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	47	**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				
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
Week 1	Introduction to GIS
Week 2	Data and Information
Week 3	Spatial Data and attribute Data
Week 4	Vectors and Raster
Week 5	Spatial Referencing
Week 6	coordinates systems
Week 7	Measurements on vectors
Week 8	Measurements on raster
Week 9	Comparison of Raster and Vector Models
Week 10	Classifications
Week 11	Data base management systems
Week 12	2D GIS
Week 13	Digital mapping
Week 14	Steps of Digital mapping production
Week 15	Layout Methods of digital maps
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to ArcGIS software
Week 2	Lab 2: Application on export of maps in ArcGIS software
Week 3	Lab 3: Application on creation of layer in ArcGIS software

Week 4	Lab 4: Application on all tools in Arc Map software
Week 5	Lab 5: Application on Arc Catalog in ArcGIS software
Week 6	Lab 6: Application on creation of shape file
Week 7	Lab 7: Application on geodata base in ARC GIS software
Week 8	Lab 8: Application on georeferenig MAP in Arc GIS software
Week 9	Lab 9: Application on Spatial selection Queries
Week 10	Lab 10: Application on Steps of Digital mapping production
Week 11	Lab 11: Application on Layout Methods of digital maps

Learning and Teaching Resources
مصادر التعلم و التدريس

	Text	Available in the Library?
Required Texts	Textbook of Remote Sensing and Geographical Information Systems, Third Edition, M. ANJI REDDY,2008	Yes
Recommended Texts	Remote Sensing and GIS Integration, Qihao Weng, Copyright © 2010 by The McGraw-Hill Companies, Inc, United States	Yes
Websites	https://www.youtube.com/playlist?list=PL-2sBQtgS7Y7rnp3fNM2ndmyNEJxpyj-B **https://www.youtube.com/channel/UCeSBVsLXOGZ9Eznu5kbHLzw/playlists?&ab_channel=GIS4YOU**	

SEMESTER EIGHT

1. SE 423

Module Information معلومات المادة الدراسية						
Module Title	**GLOBAL POSITIONING SYSTEMS II**			**Module Delivery**		
Module Type	**CORE**			☒Theory ☒Lecture ☒Lab ☐Tutorial ☒Practical ☐Seminar		
Module Code	**SE 423**					
ECTS Credits	6					
SWL (hr/sem)	150					
Module Level	4			**Semester of Delivery**		8
Administering Department	Type Dept. Code			**College**	Type College Code	
Module Leader				**e-mail**		
Module Leader's Acad. Title	Assistant Professor			**Module Leader's Qualification**		MSC
Module Tutor	Name (if available)			**e-mail**	E-mail	
Peer Reviewer Name	Name			**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023			**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Satellite Positioning Systems	**Semester**	7
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 principles and techniques of precise point positioning. 2. Learn how to use PPP for accurate positioning and navigation. 3. Familiarize yourself with real-time kinematic (RTK) methods. 4. Gain knowledge about the local method of RTK for precise positioning. 5. Evaluate and compare different GNSS observation methods. 6. Assess their accuracy and performance under various conditions. 7. Gain a comprehensive understanding of the GPS time system. 8. Learn about the concepts of week number, rollover, and calendar data using NGS. 9. Familiarize with the International GNSS Service (IGS).

	10. Understand the role and significance of different segments within the IGS. 11. Gain an overview of the Continuously Operating Reference Stations (CORS) network. 12. Understand its purpose and importance in geospatial reference systems
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Precise Point Positioning (PPP): ● Understanding the concept and principles of PPP. ● Knowledge of PPP processing techniques and algorithms. ● Ability to perform PPP calculations using GNSS observations. ● Understanding the limitations and sources of error in PPP. 2. RTK Methods (Local Method): ● Understanding the principles and applications of Real-Time Kinematic (RTK) positioning. ● Knowledge of local RTK methods and their implementation. ● Ability to perform real-time positioning using RTK techniques. ● Understanding the accuracy and limitations of RTK positioning. 3. Review and Comparison between all GNSS Observation Methods: ● Understanding different GNSS observation methods (PPP, RTK, etc.). ● Knowledge of the accuracy levels and conditions suitable for each method. ● Ability to compare and evaluate the performance of different GNSS observation ● Understanding the advantages and disadvantages of each method in different scenarios. 4. Overview of GPS Time System: ● Understanding the basics of the GPS time system. ● Knowledge of the GPS time scale and its relationship with UTC. ● Ability to convert between GPS time and UTC. ● Understanding the rollover and calendar data in the GPS time system. 5. GPS Time System (Week Number, Rollover, Calendar Data using NGS): ● Understanding the concept of week numbers in the GPS time system. ● Knowledge of the GPS time rollover issue and its implications. ● Ability to handle GPS week rollover and adjust for correct time representation. ● Understanding the usage of calendar data in the GPS time system using the National Geodetic Survey (NGS) service. 6. International GNSS Service (IGS) (Introduction and Segments): ● Understanding the role and purpose of the International GNSS Service (IGS). ● Knowledge of the different segments and components of the IGS. ● Awareness of the IGS products and services available. ● Understanding the importance of IGS in global positioning and geodetic research. 7. Overview of CORS Network: ● Understanding the concept and purpose of a Continuously Operating Reference Station ● Knowledge of the infrastructure and setup of a CORS network. ● Ability to explain the benefits and applications of a CORS network. ● Understanding the usage of CORS data in GNSS positioning and research. 8. CORS Network in Iraq (Browsing and Selecting Optimum Iraqi CORS using NGS Service): ● Knowledge of the CORS network in Iraq. ● Ability to browse and access Iraqi CORS data using the NGS service. ● Understanding the selection criteria for choosing the most suitable CORS station. ● Ability to utilize CORS data in GNSS positioning and research projects in Iraq. 9. The Iraq Geospatial Reference System (IGRS): ● Understanding the concept and components of the Iraq Geospatial Reference System ● Knowledge of the coordinate systems, datum, and transformations used in IGRS. ● Ability to perform geodetic calculations and coordinate transformations within the IGRS. ● Understanding the importance of IGRS in Iraq's geospatial projects and applications. 10. Processing GPS Data by IGS (Using the Crustal Dynamics Data Information System (

	• Understanding the process of processing GPS data using the International GNSS Service • Knowledge of the Crustal Dynamics Data Information System (CDDIS) and its data proc. • Ability to retrieve and process GPS data from the IGS network. • Understanding the data formats and software tools used in GPS data processing. 11. Processing GPS Data by Online Service: • Knowledge of online services available for processing GPS data. • Ability to utilize online platforms for GPS data processing. • Understanding the advantages and limitations of online processing services. • Ability to interpret and analyse the processed
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - GNSS observations Precise Point Positioning (PPP) and RTK method [15 hrs] GPS time systems [10 hrs] Overview of CORS network,CORS network in Iraq (brows and select optimum Iraqi CORS using NGS service) of satellite orbits (almanc, broadcast, and precise orbit), basic concept to configure geodesy GNSS receiver and make observations using static method. Part B - GNSS process The Iraq Geospatial Reference System (IGRS) , processing GPS data by IGS (using the Crustal Dynamics Data Information System (CDDIS)), and processing GPS data by online service [15]processing GPS data by online service, GNSS Error Sources (signal errors), GNSS Error Sources (observer, receiver, and others) c**orrecting GNSS Errors using specific configuration of receivers, Correcting GNSS Errors using specific techniques of observation, Process GNSS data and Download observation files from Iraqi CORS using NGS services .**
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Active Learning: This approach encourages learners to actively engage in the learning process through activities such as discussions, problem-solving, group work, and hands-on experiments. It promotes critical thinking, collaboration, and retention of information. Inquiry-Based Learning: In this strategy, learners are presented with open-ended questions or problems to investigate and explore. They develop their understanding and knowledge through research, experimentation, and analysis, fostering curiosity, problem-solving skills, and independent thinking. Collaborative Learning: This strategy emphasizes group work and cooperation among learners. It promotes communication, teamwork, and the sharing of ideas and knowledge. Collaborative learning can involve activities such as group projects, discussions, and peer teaching. Flipped Classroom: In a flipped classroom model, learners study the material independently outside of class, typically through pre-recorded lectures or online resources. Class time is then used for discussions, problem-solving, and clarification of concepts, allowing for more interactive and personalized learning experiences. Visual Aids and Multimedia: Incorporating visual aids, such as diagrams, charts, and videos, can enhance understanding and retention of information. Multimedia tools and technologies can be used to present content in an engaging and interactive manner, catering to different preferences..

	Feedback and Assessment: Providing timely and constructive feedback is crucial for effective learning. It helps learners understand their strengths and areas for improvement. Various assessment methods, including formative assessments (e.g., quizzes, discussions) and assessments (e.g., exams, projects), can be used to evaluate learning progress and provide feedback.

Student Workload (SWL)

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	Precise point positioning (PPP)
Week 2	RTK methods (local method)
Week 3	Review and Comparison between all GNSS observation methods (in term of accuracy and conditions)
Week 4	Overview of GPS Time system
Week 5	GPS Time system (week number, rollover, calender data using NGS)
Week 6	International GNSS Service (IGS) (introduction and segments)
Week 7	Overview of CORS network
Week 8	CORS network in Iraq (brows and select optimum Iraqi CORS using NGS service)
Week 9	The Iraq Geospatial Reference System (IGRS)
Week 10	processing GPS data by IGS (using the Crustal Dynamics Data Information System (CDDIS))
Week 11	processing GPS data by online service

Week 12	GNSS Error Sources (signal errors)
Week 13	GNSS Error Sources (observer, receiver, and others)
Week 14	Correcting GNSS Errors using specific configuration of receivers
Week 15	Correcting GNSS Errors using specific techniques of observation
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)

Week 1	Field work: Network RTK method by connecting to one of Iraqi cors station and observed the same stations that observed by local RTK.
Week 2	Transfer Network RTK file from the controller using flash memory, and import data using commercial software.
Week 3	Make a report to comparison between Local and Network RTK in terms of accuracy by computing the root mean square error using Matlab or excel software.
Week 4	Raw data format in GNSS receivers.
Week 5	Complete description of RINEX format
Week 6	Process data by download observations file (orbit or clock file) from CDDIS archive as (RINEX format).
Week 7	GNSS online post processing services (OPUS, AUSPOS, CSRS,)
Week 8	GNSS online post processing services ((SOPAC, SCOUT,GAPS)
Week 9	Field work to draw circle of error with 95% confident of data, by take observations for 30 minute with interval 1 minute.
Week 10	Field work: Stake out coordinates using Geodesy GNSS receiver.
Week 11	Field work: direct observed and compute area using GNSS receiver.
Week 12	Import GNSS data using civil 3d program and make a surface and alignment.
Week 13	Direct draw of GNSS data using Civil 3d software by adding cod to stations observed by GNSS receiver.
Week 14	Field work: compute the scale factor between GNSS receiver and Total Station between the ground and the grid
Week 15	Comparison the results obtained from GNSS receiver and Total stations after enter the computed scale factor

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		Yes
Recommended Texts	Bacci, G., Falletti, E., Fernández-Prades, C., Luise, M., Margaria, D. & Zanier, F. 2011. Chapter 2 - Satellite-Based Navigation Systems. Satellite and Terrestrial Radio Positioning Techniques. Oxford 1. H. Bernhard, L. Herbert, and W. Elmar (2010) "GNSS - Global Navigation Satellite Systems: GPS, GLONASS, Galileo, & more", Spring Wien New York, Austria. 2. Kaplan, E. D. & Hegarty, C. J. (2006), "Understanding GPS: Principles and Applications", 2nd Edition, ARTECH HOUSE, Boston, London.	No
Websites	https://gage.upc.edu/en/learning-materials/library/gnss-books/gnss-data-processing-book	

2. SE 422

Module Information معلومات المادة الدراسية					
Module Title	**LIDAR & LASER SCANNING**		**Module Delivery**		
Module Type	**CORE**		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar		
Module Code	**SE 422**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader			**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	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. To develop problem solving skills regarding Lidar technique usage and understanding laser profiling and scanning through the application of Radar equation. 2. To understand Lidar principals, current and future developments. 3. This course deals with the basic concept of Lidar and scanning technique using laser light. 4. This is a core subject in laser scanning for all geomatics engineers. 5. To understand principals, data acquisition, error sources, data analysis and post processing in range-based technique projects. 6. To perform application using both aerial and terrestrial platform systems and applications.

<table>
<tr><td>Module Learning Outcomes

مخرجات التعلم للمادة الدراسية</td><td>

Recognize how laser scanning projects works in multiple applications.
List the various terms associated with aerial and terrestrial laser scanning.
Summarize what near infrared scanning meant and their physical background.
Discuss the reaction and involvement of laser with ground objects.
Describe mathematical solutions including Lidar equation.
Define data acquisition, quality assurance, and data analysis.
Identify error sources and optimization.
Discuss TOF scanning types including discrete and FWF.
FWF data analysis and object detection algorithms.
Strip adjustment, data calibration, data registration, and geo-referencing.
Radiometric calibration and backscatter cross-section parameters.
TLS practical considerations including project planning, data acquisition, and control in laser projects.
Discuss the various properties of ground objects and how this can affect accuracy and precision measurements.
Quality assurance and control in Laser scanning data.
MLS systems, concepts, modes, calibration and registration.
Applications and real case studies simulation.
</td></tr>
<tr><td>Indicative Contents
المحتويات الإرشادية</td><td>Indicative content includes the following.
Part A - Lidar
Introduction to Lidar, Lidar vs photogrammetry, basic components, important parameters, Radar equation, main applications, scanning mechanism, beam divergence polygon mirrors and scan patterns, interaction with targets. [15 hrs]
Lidar flight mission, Lidar equation, ALS systems, discrete and FWF, FWF analysis and simulation, FWF vs discrete, potential of FWF, UAV Lidar. [15 hrs]
FWF signal processing, development cycle, post-processing of small foot print, standard pulse detection methods, Gaussian decomposition, RGD method. [15 hrs]
Radiometric calibration of FWF, state of the art calibration, physical background, radar equation, backscatter cross-section, incident angle estimation, RSN method, reflectivity measurements, reference target, calibration constant. [15 hrs]
Applications and data visualization, simulation, analysis, and quality assurance considerations.
Part B – Laser scanning (TLS & MLS)
TLS principals, TLS vs traditional, static and dynamic systems, TLS practical pipeline, field operations, data preparation, data registration, data post-processing. [15 hrs]
Direct and indirect registration, direct and indirect geo-referencing. [10 hrs]
MLS systems, observation modes, system design, error types, calibration and geo-referencing, geometric calibration, indoor and outdoor applications. [15 hrs]
Strip adjustment, relative vs absolute strip orientation, data analysis, and quality control. [15 hrs]
Applications in MLS and TLS of real case studies [10 hrs]</td></tr>
<tr><td colspan="2">Learning and Teaching Strategies
استراتيجيات التعلم والتعليم</td></tr>
<tr><td>Strategies</td><td>The main strategy that will be adopted in this course is to encourage students’ participation both in theoretic and the exercise materials, while at the same time refining and expanding their critical thinking skills regarding this outstanding new technology. This will be achieved through classes, interactive tutorials, field practical sessions, and by considering types of lab training and data processing experiments involving some sampling application case studies that are interesting to the students.</td></tr>
<tr><td colspan="2">Student Workload (SWL)
الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا</td></tr>
</table>

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

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	20% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	/	/		
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Lidar principals and introduction, Lidar vs photogrammetry, basic components, important parameters, Lidar
Week 2	Radar equation, main applications, scanning mechanism, Power fundamentals
Week 3	Beam divergence polygon mirrors and scan patterns, interaction with targets
Week 4	Lidar flight mission, Lidar equation, ALS systems, discrete and FWF
Week 5	FWF analysis and simulation, FWF vs discrete, potential of FWF, UAV Lidar
Week 6	FWF signal processing, development cycle, post-processing of small foot print lidar signals
Week 7	Standard pulse detection methods, Gaussian decomposition, RGD method
Week 8	Radiometric calibration of FWF, state of the art calibration, physical background, radar equation
Week 9	Backscatter cross-section, incident angle estimation, RSN method, reflectivity measurements, reference target
Week 10	Applications and data visualization, simulation, analysis, and quality assurance considerations
Week 11	TLS principals, TLS vs traditional, static and dynamic systems
Week 12	TLS practical pipeline, field operations, data preparation, data registration, data post-processing
Week 13	Direct and indirect registration, direct and indirect geo-referencing
Week 14	MLS systems, observation modes, system design, error types, calibration and geo-referencing, geometric calibration, indoor and outdoor applications
Week 15	Strip adjustment, relative vs absolute strip orientation, data analysis, and quality control

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

Delivery Plan (Weekly Lab. Syllabus)
المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Introduction to LS
Week 2	Lab 2: ALS data visualization in CC software
Week 3	Lab 3: ALS data processing using tools in CC software
Week 4	Lab 4: ALS data processing using tools in QT Modeler
Week 5	Lab 5: TLS system familiarization- Field work
Week 6	Lab 6: TLS data acquisition Field work – day 1
Week 7	Lab 7: TLS data acquisition Field work – day 2
Week 8	Lab 8: TLS data expansion and visualization
Week 9	Lab 9: TLS data registration and filtering
Week 10	Lab 10: TLS data registration – day 2
Week 11	Lab 11: TLS data geo-referencing
Week 12	Lab 12: TLS data analyzing
Week 13	Lab 13: TLS data exporting and derivable

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Airborne and Terrestrial laser scanning, Vosselman & Mass, 2010.	Yes/online
Recommended Texts	Photogrammetry- Geometry from images and laser scans, Karl Kraus, 2007.	Yes/ Online
Websites		

3. SE 424

Module Information معلومات المادة الدراسية				
Module Title	GEOSPATIAL INFORMATION SYSTEMS II		**Module Delivery**	
Module Type	**CORE**		☒ Theory ☒ Lecture ☒ Lab ☐ Tutorial ☐ Practical ☐ Seminar	
Module Code	SE 424			
ECTS Credits	6			
SWL (hr/sem)	150			
Module Level	4		**Semester of Delivery**	8
Administering Department	Type Dept. Code		**College**	Type College Code
Module Leader			**e-mail**	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail
Peer Reviewer Name	Name		**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023		**Version Number**	1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	• To understand of 3D-GIS through the application of types of GIS analyses • To understand Proximity analysis and spatial analysis. • This course deals with Surfaces. • To Know Surfaces and its types and generation surfaces methods. • To understand Surface analysis, Topography analysis • To perform Spatial statistics analysis ,suitability and hydrological analyses
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	• Recognize how works in 3D-GIS analyses. • List the various analyses associated with 3D-GIS • Summarize all the types of GIS analyses. • Discuss the 3D- Surfaces in GIS. • Describe Geometric analysis (cut/fill, Visibility, line of sight, area and volume).

	• Define Conversion between raster and TINs. • Identify the Spatial statistics analysis in GIS.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Data Analysis and Modelling in GIS; Introduction, Format Conversion, Data Structure Conversion, Conversion of Different Raster Formats, Data Medium Conversion, Mode of Digitization [20 hrs.] Scan Digitizing Systems, Line Array of Detectors, Spatial Measurement Methods, Reclassification, and Buffering analyses Techniques [20 hrs.] Overlay Analysis, Vector Overlay Capabilities, Topological Overlay, Raster Overlay ,[15 hrs] Modelling Surfaces, DTM Generation, Triangulated Irregular Network (TIN),DTM Manipulation, DTM Interpretation, Slope Model, DTM Visualization, DTM Applications [25 hrs] Geometric analysis; (cut/fill, Visibility, line of sight, area and volume). [15 hrs] Hydrological analysis in GIS, Solar radiation analysis, [15hrs] Spatial statistics analysis, Suitability analysis ,[15 hrs] Modelling Networks, GIS Output, Maps as Output, Graphical Outputs. [15 hrs.]]

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	The main strategy that will be adopted in this course is to encourage students' participation both in theoretic and the exercise materials, while at the same time refining and expanding their critical thinking skills regarding this outstanding new technology. This will be achieved through classes, interactive tutorials, field practical sessions, and by considering types of lab training and data processing experiments involving some sampling application case studies 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 10	LO #1, #2 and #10, #11
	Assignments				
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	
	Midterm Exam	2hr	10% (10)	7	LO #1 - #7

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Spatial analysis: Overlay functions [clip,]
Week 2	intersect, union, erase, identity
Week 3	Proximity analysis:[buffer, thiessen polygon]
Week 4	Statistics analysis :[frequency]
Week 5	summary statistics
Week 6	Data presentation:3D analysis
Week 7	3D Objects
Week 8	3D GIS, Surfaces:[raster, TIN]
Week 9	Conversion between raster and TINs
Week 10	Surface analysis, Topography analysis [slope, aspect, , hill shade, contour]
Week 11	Geometric analysis (cut/fill, Visibility ,line of sight, area and volume)
Week 12	Hydrological analysis in GIS
Week 13	Solar radiation analysis
Week 14	Spatial statistics analysis
Week 15	Suitability analysis
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to Arc tool box in ArcGIS software
Week 2	Lab 2: Application on Spatial analysis tools
Week 3	Lab 3: Application on Proximity analysis tools
Week 4	Lab 4: Application on Statistics analysis tools
Week 5	Lab 5: Application on 3D-Surface analysis tools
Week 6	Lab 6: Application on Topography analysis tools
Week 7	Lab 7: Application on Geometric analysis tools
Week 8	Lab 8: Application on Hydrological analysis tools

Week 9	Lab 9: Application on Solar radiation analysis tools
Week 10	Lab 10: Application on Spatial statistics analysis tools
Week 11	Lab 11: Application on Suitability analysis tools

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Textbook of Remote Sensing and Geographical Information Systems, Third Edition, M. ANJI REDDY,2008	Yes
Recommended Texts	Remote Sensing and GIS Integration, Qihao Weng, Copyright © 2010 by The McGraw-Hill Companies, Inc, United States	Yes
Websites	https://www.youtube.com/playlist?list=PL-2sBQtgS7Y7rnp3fNM2ndmyNEJxpyj-B **https://www.youtube.com/channel/UCeSBVsLXOGZ9Eznu5kbHLzw/playlists?&ab_channel=GIS4YOU**	

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