



**Republic of Iraq Ministry of Higher Education &
Scientific Research
Northern Technical University
Technical Agricultural College/ Mosul
Department of Desertification Control Technology**

NTU

TAC

Department of Desertification Control Technology

MODULE DESCRIPTION FORM

Module Information					
Module Title	Plane surveying and engineering drawing			Module Delivery	
Module Type	S			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	TAMO 300				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level	3		Semester of Delivery		
Administering Department	Department of Desertification Control Technology		College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title	lecturer		Module Leader's Qualification		
Module Tutor			e-mail		
Peer Reviewer Name	Name		e-mail	E-mail	
Scientific Committee Approval Date			Version Number		

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introducing the student to the principles of surveying, tools and equipment used, and some of the operations and activities used in flat surveying, in addition to the principles of measuring angles and directions. The student will be required to perform some operations such as the distance scale, errors and obstacles in it, and the use of the flat board in drawing and projecting maps, measuring areas, roads and the machines used in it, and finally using the compass in measuring angles and directions, and the principles of spreading the area in agricultural projects. Teaching students how to recognize and use engineering drawing tools and some operations in engineering drawing, projections, three-dimensional shapes, sections and some simple shapes in the sections of irrigation canals and agricultural facilities.
Module Learning Outcomes	- The student will be able to measure areas and erect and drop columns. The student will be able to use a flat board. The student will be able to read angles and calculate internal angles and directions. Use modern technologies in designing fields, agricultural buildings and gardens. The ability to manage agricultural and animal activity in dry farming areas to achieve the best possible efficiency through the optimal distribution of irrigation systems. Developing means, equipment and machines in line with the labor market.
Indicative Contents	Part One: Getting a general idea about the area, its divisions and uses, methods of measuring distances, and erecting and projecting columns. (9 hours). Part Two: Knowing the obstacles and impediments in measuring distances, and learning about cartography, types of maps, and methods of reading the map (9 hours). Part Three: Siemens' rule, erecting columns at unequal intervals, and using the Planmer device (9 hours). Part Four: Reading the angles between the sides using a compass, and calculating the internal angles and directions of polygons using a compass (9 hours). Part Five: Getting a general idea about the engineering drawing material, AutoCAD program, drawing tools and their shortcuts, and how to draw straight lines, circles, and two-dimensional rectangles (9 hours). Part Six: Finding the third plan for the other waterfalls and drawing models for the three waterfalls, in addition to doing practical exercises to draw the waterways and irrigation canals (9 hours). Part Seven: Drawing arcs and polygons, learning the methods of deletion and addition in drawing, and learning how to draw trigonometric projections (9 hours).

Learning and Teaching Strategies	
Strategies	Working to increase knowledge to gain practical experience from others through educational videos and training courses to obtain new scientific information in the cognitive field. Practical field training and how to take field measurements. Access to modern scientific literature. Scientific laboratories with other universities

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	150		

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)	Continuou s	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	Material Covered
Week 1	Definition of area - its divisions - its types - its uses
Week 2	Measuring distances - its cases - erecting and dropping columns, obstacles and barriers in measuring distances
Week 3	Cartography - Types of maps - Map scales - Methods of reducing and enlarging maps
Week 4	Flat plate scanning - its tools - its advantages - its disadvantages - its conditions of use and methods of using the flat plate - the beam method - the front intersection method
Week 5	Measuring areas using the field method – dividing the plot into triangles – erecting columns at equal intervals
Week 6	Smith's rule - erecting columns at unequal intervals
Week 7	Measurements on the map - Dividing the plot into triangles - Using squares
Week 8	Using a planimeter
Week 9	Prismatic Compass - Magnetic and True North - Angles of All Kinds
Week 10	Reading the angles between the sides using a compass and calculating the interior angles and directions of polygons using a compass
Week 11	General idea about engineering drawing material - its importance - learning how to use engineering drawing tools - drawing the frame of the painting and the title
Week 12	Establishing a perpendicular to a straight line from a point on it and outside it - bisecting a straight line - bisecting a known angle - drawing a straight line parallel to another - dividing a straight line and drawing a circle passing through the vertices of the angles of a triangle from the outside and inside - finding the center of a circle or an arc drawing a tangent to a circle from a known point on its circumference and outside it
Week 13	The three projections (practical exercises) and drawing solids from the three projections
Week 14	Drawing sectors and practical exercises on them
Week 15	Drawing drains and irrigation canals of all kinds, and drawing sections in dams and reservoirs.
Week 16	Exams

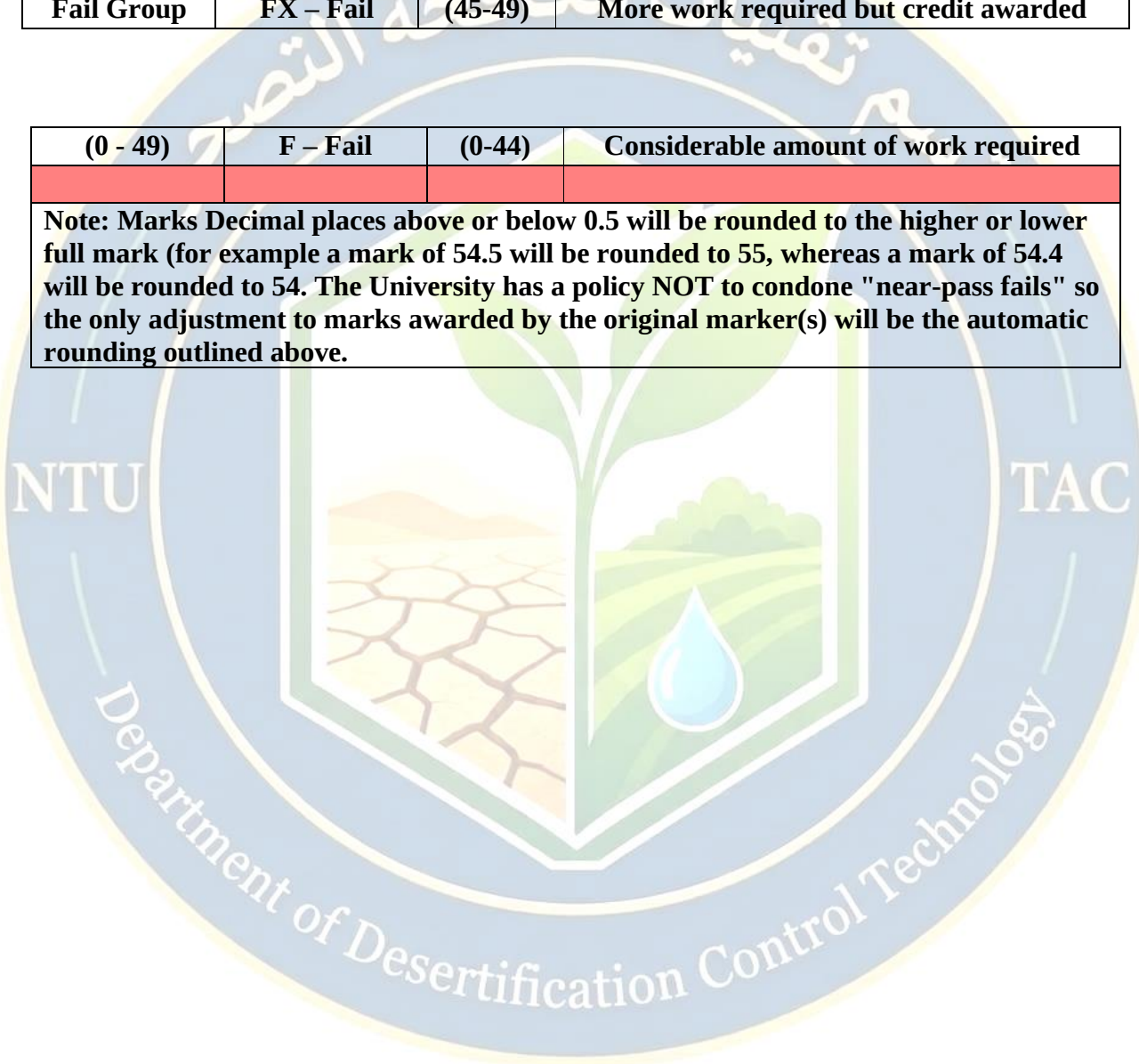
Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	General idea about engineering drawing material - its importance - learning how to use engineering drawing tools - drawing the frame of the painting and the title
Week 2	Types of fonts - Arabic geometric letters - illustrative examples
Week 3	Establishing a perpendicular to a straight line from a point on it and outside it - bisecting a straight line - bisecting a known angle - drawing a straight line parallel to another - dividing a straight line
Week 4	Drawing a circle passing through the vertices of the angles of a triangle from the outside and inside - Finding the center of a circle or an arc Drawing a tangent to a circle from a known point on its circumference and outside it
Week 5	Draw an arc with a given radius that touches two circles from the outside and inside and from the outside and inside
Week 6	Perspective drawing of a circle at an angle of 30 or 40 degrees
Week 7	The Three Projections (Practical Exercises)
Week 8	Find the third projection from the other projections
Week 9	Drawing solids from the three projections
Week 10	Drawing solids from the three projections
Week 11	Practical exercises for drawing solids
Week 12	Drawing sectors and practical exercises on them
Week 13	Drawing drains and irrigation canals of all kinds
Week 14	Drawing sections in dams and reservoirs
Week 15	How to ink drawings and how to use ink pens
16Week	Exam

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Autocad 2014	Yes
Recommended Texts	https://www.google.iq/books/edition/%D8%A7%D9%84%D8%B1%D8%B3%D9%85_%D8%A7%D9%84%D9%87%D9%86%D8%AF%D8%B3%D9%8A_%D8%A8%D8%A7%D8%B3%D8%AA%D8%AE%D8%AF%D8%A7/lnIDwAAQBAJ?hl=ar&gbpv=1&dq=%D8%A8%D8%B1%D9%86%D8%A7%D9%85%D8%AC%20%D8%A7%D9%88%D8%AA%D9%88%D9%83%D8%A7%D8%AF&pg=PA17&printsec=frontcover	Yes
Websites		

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

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

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



MODULE DESCRIPTION FORM

Module Information					
Module Title	Tissue Culture			Module Delivery	
Module Type	C			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	DES 300				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3	Semester of Delivery		
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Omar ahmed fathi		e-mail	omar.ah.f@ntu.edu.iq	
Peer Reviewer Name			e-mail	E-mail	
Scientific Committee Approval Date		1/4/2024	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- A definition of plant histology - a brief history. A definition of plant histology - a brief history. A definition of plant histology - a brief history.
Module Learning Outcomes	Cognitive goals 1- Identify growth regulators used in plant tissue cultures 2- Study the stages of tissue culture growth Course-specific skills objectives. 1- Planting buds and stem cuttings 2- Increasing impure succulent plants 3- Grafting parts of regular desert plants
Indicative Contents	1- That what the student studies should be consistent with his inclinations and thinking trends 2- That the student feels the importance of correcting refractive errors in the eye 3- The student should listen carefully to the professor's explanation 4- That the student feels what cognitive excellence and excellence mean 5- That the student recognizes the impact of science and scientists 6- The student must pay attention to respecting the time and class system



Learning and Teaching Strategies	
Strategies	1- Types of communication in the field of work 2- The ability to express and convey ideas clearly and confidently 3- Teamwork.

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.8
Total SWL (h/sem)	150		

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)	Continuou s	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)	
	Material Covered
Week 1	Introduction to plant histology - a brief history
Week 2	Plant tissue culture laboratory - shapes and designs
Week 3	Food environment and its components
Week 4	Growth regulators used in plant tissue cultures
Week 5	Preparing and sterilizing the food environment
Week 6	Tissue culture formation and callus development
Week 7	Stages of tissue culture growth
Week 8	Suspension cell cultures
Week 9	Vaccination in test tubes
Week 10	Inoculation in test tubes
Week 11	Protoplast culture and fusion – cell hybridization processes
Week 12	Cultivation of embryos and pollen
Week 13	Producing disease-free plants
Week 14	Industrial seed production
Week 15	Propagation of desert plants for tissue
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Practical Syllabus)	
	Material Covered
Week 1	Getting to know the tissue culture laboratory and laboratory equipment
Week 2	Preparing basic solutions for the food environment
Week 3	Dissolving and preparing basic solutions of plant growth regulators
Week 4	Preparing and sterilizing the food environment
Week 5	Preparing, sterilizing, and culturing plant parts (focusing on desert plants).
Week 6	Cultivation of growing tops
Week 7	Planting shoots and stem cuttings
Week 8	Cultivation of root tissue parts
Week 9	Culture of embryos and pollen
Week 10	Formation of callus farms for desert plants
Week 11	Propagation of unclean succulent plants
Week 12	Propagation of desert trees with tissue
Week 13	Propagation of desert shrubs with tissue
Week 14	Grafting parts of regular desert plants
Week 15	Showing films about tissue culture.

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	أساسيات وتطبيقات زراعة الأنسجة النباتية	
Recommended Texts		
Websites	/ 9786205634486 / 6-63448-5-620-978 / 6205634481 (noor-publishing.com)	

Grading Scheme			
Group	Grade	Marks %	Definition
Success Group (50 - 100)	A - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group	FX - Fail	(45-49)	More work required but credit awarded
(0 - 49)	F - Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

MODULE DESCRIPTION FORM

Module Information					
Module Title	Vegetables Production			Module Delivery	
Module Type	Core			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	DES 301				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3 rd Level	Semester of Delivery		
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Mohammed Salem Ahmed		e-mail	mohameedsa66@ntu.edu.iq	
Peer Reviewer Name			e-mail		
Scientific Committee Approval Date			Version Number		

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introducing the student to the most important vegetables and methods of producing and serving them. Learn about methods of classifying summer and winter crops and the plant families for each crop. And methods of propagation and able to describe the appropriate environment for each crop.
Module Learning Outcomes	Introducing students to the most important types and varieties of vegetable crops that can be successfully cultivated and traded in Iraq. Study the most important environmental requirements (climate and soil) necessary for the successful cultivation of some vegetable crops. Introducing students to the most important horticultural operations that must be carried out correctly for the successful cultivation of some vegetable crops Study the most important methods of reproduction and production of vegetables. Introducing students to the most important types of each type of vegetable studied
Indicative Contents	Indicative content includes the following. Part A - theoretical part Factors that must be taken into consideration when establishing a vegetable field, selecting and preparing permanent land for growing vegetables. . [3 hrs] Propagation of vegetable crops, advantages and disadvantages of sexual reproduction, specifications that must be met by vegetable seeds, examination of vegetable seeds. . [3 hrs] Treatment of vegetable seeds, vegetative propagation, advantages and disadvantages of vegetative propagation, conditions that must be applied when carrying out vegetative propagation. . [3 hrs] Methods of vegetative propagation, methods of planting vegetable seeds, advantages of planting with seedlings. . [3 hrs] Dividing vegetable crops according to their ability to tolerate transplanting, factors affecting the success of the transplanting process. . [3 hrs] Seedling production methods, acclimatization methods, seedling pruning, and specifications that must be met by vegetable seedlings. [3 hrs]. Agricultural operations in vegetable crops, covering the soil surface, benefits of fertilization in vegetable crops . [3 hrs]
	Part B - practical part .Crops of the Solanaceae family, their types, reproduction, suitable soil, and planting date. [9 hrs] .Crops of the cucurbit family, their types, reproduction, suitable soil, and planting date. [9 hrs] .Crops of the mallow family, their types, reproduction, suitable soil, and planting date. [9 hrs]

Learning and Teaching Strategies	
Strategies	1. Explanation and clarification 2. Giving lectures 3. Field practical exercises 4. Playing videos and pictures 5. Daily and monthly exams

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.8
Total SWL (h/sem)	150		

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)	Continuou s	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	Material Covered
Week 1	Agricultural cycles for vegetable crops (definition, benefits, design principles, models for vegetable cycles).
Week 2	Production of vegetable seedlings (types of agricultural media, specifications of good seeds, seedling density and seedling care processes, types of containers).
Week 3	Production of Solanaceae family plants (tomatoes and eggplant).
Week 4	Solanaceae family (peppers and potatoes).
Week 5	The Cucurbita family (cucumber, zucchini, and hazel).
Week 6	The cucurbit family (cucumber, watermelon, cucumber).
Week 7	The legume family (cowpea, beans).
Week 8	Production of sweet potatoes and maza (tartufa).
Week 9	Production of okra and sugar corn.
Week 10	Production of basil and mint.
Week 11	Production of asparagus and taro.
Week 12	Production of berbene and molokhia.
Week 13	Production of strawberries and artichokes.
Week 14	Agricultural mushroom production.
Week 15	Other vegetables (gotha, cassava).
Week 16	Exam

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Vegetable Production, Prof. Dr. Hussein Jawad Muharram Al-Bayati 2020 University of Mosul	Yes
Recommended Texts		NO
Websites	https://uomosul.edu.iq/agriculture/wp-content/uploads/sites/11/2023/09/%D8%A7%D9%86%D8%AA%D8%A7%D8%AC-%D8%AE%D8%B6%D8%B1_compressed.pdf	

Delivery Plan (Weekly Lab. Syllabus)	
week	Material Covered
Week 1	Botanical classification of vegetable plants.
Week 2	For sexual reproduction of vegetable plants..
Week 3	Vegetative reproduction of vegetable plants.
Week 4	Types of irrigation systems.
Week 5	Soil preparation and production of cauliflower, cabbage, onion and lettuce seedlings.
Week 6	Plant description, botanical classification and diversity for the cruciferous family
Week 7	Plant description, botanical classification and diversity for the umbelliferous family.
Week 8	Plant description, botanical classification and diversity for the legume family.
Week 9	Plant description, botanical classification and diversity for the ramoraceae family. Plant description, botanical classification and diversity for different families.
Week 10	Plant description, botanical classification and diversity for different families.
Week 11	Chicory, shishioria, turnip, broccoli, mustard.
Week 12	Field cultivation training in the fields.
Week 13	Types of fertilizers and methods of application.
Week 14	Pesticide control for vegetable plants.
Week 15	Storage of plant products.
Week 16	Exam

Grading Scheme			
Group	Grade	Marks %	Definition
Success Group (50 - 100)	A - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group	FX - Fail	(45-49)	More work required but credit awarded
(0 - 49)	F - Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

MODULE DESCRIPTION FORM

Module Information					
Module Title	principals of Irrigation & Drainage			Module Delivery	
Module Type	Department requirements			☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	DES 302				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3 rd Leval	Semester of Delivery		
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Ruaa Nawfal Nafea Alshamaa		e-mail	Ruaaa9@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		01/04/2024	Version Number		1.0

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introducing the student to methods of delivering water and using it to irrigate agricultural land and acquiring the necessary skills to implement an irrigation project and irrigation systems therein and how to conduct them. Preparing and preparing the student to pay attention to digging and land reclamation and providing him with information to develop his necessary experience in field investigation work.
Module Learning Outcomes	Cognitive goals - The ability to determine the foundations of irrigation and drainage in dry areas. - The ability to determine climate elements in dry areas and irrigation methods - Study of plants and their relationship to the ecosystem and climate elements in dry areas - Identifying plant succession, Iraq's climatic zones, and its environmental types. Course-specific skills objectives. - The ability to discuss in a scientific spirit and express what constitutes a study of the subject. - The ability to communicate and inquire with the subject teacher - Writing reports related to the subject's vocabulary after identifying the scientific sources available in the library on topics related to the environment and dry areas.
Indicative Contents	1- That what the student studies should be consistent with his inclinations and thinking trends 2- That the student feels the importance of correcting refractive errors in the eye 3-The student should listen carefully to the professor's explanation 4- That the student feels what cognitive excellence and excellence mean 5- That the student recognizes the impact of science and scientists 6-The student must pay attention to respecting the time and class system

Learning and Teaching Strategies	
Strategies	1- Types of communication in the field of work 2- The ability to express and convey ideas clearly and confidently 3- Teamwork.

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.8
Total SWL (h/sem)	150		

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)	Continuou s	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)	
	Material Covered
Week 1	The science of irrigation, its definition, the benefits of irrigation, an idea about the types of irrigation, the physical characteristics of the soil, field capacity, wilting point, soil moisture and methods of measuring it, saturation.
Week 2	Water seepage and leakage, soil-seepage relationship, irrigation water preparation, water consumption and measurement methods
Week 3	Water standard, calculating irrigation depth, calculating sections for open channels and drainages using equations (Mank, Chezi, Darcy, optimal hydraulic section)
Week 4	Field surveys for irrigation and drainage projects, general planning for irrigation and drainage networks, levels of open canals
Week 5	Leakage from canals, lining of canals, its benefits, types of lining, materials used in lining.
Week 6	Land adjustment and leveling works (calculating the depths of excavation and backfilling)
Week 7	Surface irrigation, strip irrigation, and sprinkler irrigation.
Week 8	Calculator applications about irrigation.
Week 9	Puncture, introduction, excess water, its sources and effect on plants, methods of treating it, controlling sources of excess water.
Week 10	Permeability, permeability coefficient, measured in the laboratory, constant and variable pressure method, field method for measuring permeability (cylindrical hole method, piezometer method)
Week 11	Study theory, Forchheimer, types of trocars, open trocars, covered trocars, surface trocars and their calculations, calculating the spacing of subsurface trocars for homogeneous soils.
Week 12	Land reclamation, introduction to the land washing process, washing requirements, washing efficiency coefficient, water and salt balance for various saline lands, washing processes in saline soils and waterlogged soils.
Week 13	Trocar installations, trocar materials (tubes, pipe covers), special accounts
Week 14	Operating irrigation and drainage projects, stages of operation and maintenance of irrigation and irrigation, and maintenance sections.
Week 15	Drainage networks, operation of the drainage system, water drainage methods, types of maintenance of irrigation and drainage projects, maintenance machines and equipment, removing brush and reeds from streams and graveyards, maintenance of the drainage system, drainage problems in Iraq, land reclamation methods in northern, central and southern Iraq..
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Practical Syllabus)	
	Material Covered
Week 1	Showing films and slides on irrigation, an experiment to determine the apparent and true density of the soil, solving problems about the physical properties of the soil.
Week 2	Solving problems about field capacity, an experiment to measure moisture content using the laboratory method, an experiment to measure moisture content using field methods.
Week 3	An experiment to estimate the rate of water flow into the soil, solve problems about water consumption, solve problems about water consumption, and calculate the number of plants.
Week 4	Calculating sections for open canals using different rates, drawing longitudinal and transverse sections of irrigation canals, experimenting with measuring water seepage from canals.
Week 5	A scientific visit to one of the irrigation projects.
Week 6	Conduct modification and adjustment work for a specific field
Week 7	Exercises on strip irrigation, exercises on sprinkler irrigation
Week 8	Calculator applications about irrigation
Week 9	Designating an area and conducting a survey of it, drawing a topographical map of the area, showing a scientific film on how to implement trocars.
Week 10	A scientific visit to one of the mining projects in the region.
Week 11	Collecting samples of ground water and measuring its electrical conductivity and exchangeable sodium ratio, a laboratory experiment to wash the soil of salts, water and salt balance issues.
Week 12	Placing a network of trocars in an area and taking the possibilities of changing the network. Drawing a longitudinal section of specific trocars and putting all the details on it along with the design of the trocars.
Week 13	Preparing schedules for periodic maintenance work and filling them out by the students, a scientific visit to the earthquake project, viewing the machines and excavators used in the implementation and maintenance work of the earthquake.
Week 14	Using the Internet to view the latest developments in puncture projects in the world
Week 15	Maintaining types of pumps used in drainage projects, identifying defects in drainage networks and how to fix them, discussing one of the drainage projects implemented in Iraq.

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	محاضرات حسب المنهج المقرر	
Recommended Texts	تقنيات الري الحديث ومواضيع اخرى في المسألة المائية / د. عصام خضر	
Websites		

Grading Scheme			
Group	Grade	Marks %	Definition
Success Group (50 - 100)	A - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group (0 - 49)	FX - Fail	(45-49)	More work required but credit awarded
	F - Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

MODULE DESCRIPTION FORM

Module Information					
Module Title	Principle of Horticulture		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☒ Practical ☐ Seminar		
Module Code	DES 303				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3 rd Level			Semester of Delivery
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Mohammed Salem Ahmed		e-mail	mohameedsa66@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date			Version Number		

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Learn about gardening basics Differentiate between the main horticultural science departments
Module Learning Outcomes	The student learns about the types of plants: fruits, vegetables, and ornamental plants The student studies plant families The student learns the effect of environmental factors on plant growth The student learns about different methods of planting seeds The student learns about methods of creating orchards
Indicative Contents	Indicative content includes the following. Part A - theoretical part Definition of horticulture, its divisions, and methods of dividing plants . [3 hrs] Plant families and their importance in identifying plants to know their needs and planting times [3 hrs] Growth problems and environmental needs are fundamental [3 hrs] Part B - practical part Preparing different growing media and identifying their types in the field . [9 hrs]. Identify the different horticultural facilities and tools for agriculture . [9 hrs]. Planting seeds of ornamental plants, fruits and vegetables . [9 hrs]. Conducting various vegetative propagation operations . [9 hrs]. Following up on planted plants, fertilizing them, and combating diseases that affect plants [9 hrs].

Learning and Teaching Strategies	
Strategies	The necessity of visiting to gain experience from others. Obtaining new scientific information in the field of scientific research (videos). Practical training in the field. Access to modern scientific literature. Participation in relevant scientific conferences. Scientific laboratories with other universities.

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5.2
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	150		

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)	Continuou s	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	Material Covered
Week 1	Definition of horticulture, the economic and nutritional importance of horticultural crops, division of crops
Week 2	The effect of environmental factors on the production of horticultural crops
Week 3	Soil service operations
Week 4	Propagation of horticultural plants by seeds
Week 5	Vegetative propagation of crops
Week 6	Physiology of reproduction
Week 7	Morphological structures of plant parts
Week 8	The most important methods of propagation - varieties - the most important service operations - economic and nutritional importance
Week 9	The most important deciduous fruit trees in Iraq - importance - methods of propagation - varieties - most important service operations
Week 10	Fruit tree service
Week 11	The most important summer vegetables in Iraq
Week 12	The most important winter vegetables in Iraq
Week 13	The most important ornamental and shade plants, methods of propagation
Week 14	Alarm crops
Week 15	Spices and medicinal crops
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus)	
week	Material Covered
Week 1	View propagation facilities and gardening fields
Week 2	Identify the fruit trees grown in the area
Week 3	Learn about ornamental seeds and different vegetables
Week 4	Preparing different growth media
Week 5	Cultivation of seeds in different agricultural environments
Week 6	Methods of planting seeds in panels, terraces, and terraces
Week 7	How to take cuttings for fruit trees and plant them
Week 8	Propagation of some plants by tubers and bulbs
Week 9	Planning a regular fruit orchard
Week 10	Orchard service operations
Week 11	Growing and caring for vegetable plants in greenhouses and greenhouses
Week 12	Vegetable crop service
Week 13	Identifying ornamental plants in the laboratory
Week 14	Individualization, transplantation and service of ornamental plants
Week 15	How to implement a geometric garden
Week 16	Exam

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Principle of Horticulture 2017 الحدائق وهندسة البستنة علم مبادئ أ.م. أياد هاني إسماعيل العلاف كلية الزراعة والغابات / جامعة الموصل	Yes
Recommended Texts		No
Websites	Ayad_alalaf@yahoo.com	

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

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

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	Statistics, design and analysis of experiments		Module Delivery		
Module Type	Core		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar		
Module Code	TAMO 301				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3 rd Level	Semester of Delivery		6
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title	lecturer		Module Leader's Qualification	Ph.D.	
Module Tutor	Omar ahmed fathi		e-mail	omar.ah.f@ntu.edu.iq	
Peer Reviewer Name			e-mail		

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Providing the student with experience in how to design experiments, then collect data, classify it, analyze it, then summarize it and come up with a recommendation to solve the problem for which the experiment was conducted.
Module Learning Outcomes	Creating a solid scientific basis in the theoretical and practical aspects applied in the field of istical programs. Providing the student with the skill of collecting primary data and summarizing it to solve the problem to be studied
Indicative Contents	Indicative content includes the following. Part A - theoretical part Completely randomized design, advantages, disadvantages, use of the design if one observation is recorded for each experimental unit, A- if the number of repetitions is equal Part B - practical part Statistical analysis of data



Learning and Teaching Strategies	
Strategies	The necessity of visiting to gain experience from others. Obtaining new scientific information in the field of scientific research (videos). Practical training in the field. Access to modern scientific literature. Participation in relevant scientific conferences. Scientific laboratories with other universities.

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	150		

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 1	The concept, importance, objectives and benefits of the agricultural census Agricultural census methods - types of samples - problems and obstacles to the agricultural census - sources of errors in the agricultural census
Week 2	Measures of dispersion
Week 3	Steps to implement the agricultural census, land statistics, agricultural production statistics - benefits of agricultural statistics
Week 4	General definitions, experiment, design, working experimental unit, experimental error, conditions for controlling experimental error, basic rules for designing experiments, requirements for a good experiment, steps followed in scientific experiments.
Week 5	Completely randomized design, advantages, disadvantages, use of the design if one observation is recorded for each experimental unit, A- if the number of repetitions is equal
Week 6	Completely randomized design, advantages, disadvantages, using the design in the case of recording one observation for each experimental unit, b - in the case of unequal repetitions.
Week 7	Diagnosing the significance of differences between arithmetic means, the coefficient of variation in the experiment. Completely randomized block design, conditions for using the design, advantages and disadvantages of the design, sources of variation.
Week 8	Analysis of variance, determining the number of replicates, estimating the missing value (or more) in segments
Week 9	Latin square design, terms of use, advantages and disadvantages of the design.
Week 10	Sources of variation in Latin square, analysis of variance, missing value estimation or more.
Week 11	Factorial experiments, their conditions, advantages and disadvantages
Week 12	Sources of variation in factorial experiments, analysis of variance, interaction and its types.
Week 13	Split panel design, conditions, advantages, disadvantages
Week 14	Sources of variation in split plate experiments, analysis of variance
Week 15	Correlation and regression

Delivery Plan (Weekly Lab. Syllabus)	
week	Material Covered
Week 1	Measures of dispersion
Week 2	A continuation
Week 3	Types of experiments, how to plan the experiment, and researcher specifications.
Week 4	Solve exercises to analyze data for a completely randomized design
Week 5	Solve exercises on determining the significance of differences between means
Week 6	Solve exercises to analyze data from a randomized complete block design
Week 7	Exercises to find the missing value in completely randomized blocks
Week 8	Latin square, design, analysis of sources of variation.
Week 9	Solve exercises to analyze the sources of variation in the design of the Latin square
Week 10	Solve exercises to analyze the sources of variation in the design of the Latin square
Week 11	designing factorial experiments
Week 12	Solve exercises for designing factorial experiments
Week 13	To analyze the variation of sources of variation in split panel designs
Week 14	Solve exercises to analyze the variance of sources of variation in split panel designs
Week 15	Solve exercises to find correlation and regression coefficients.

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Design and analysis of experiments book	Yes
Recommended Texts		No
Websites		

Grading Scheme			
Group	Grade	Marks %	Definition
Success Group (50 - 100)	A – Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C – Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E – Sufficient	50 - 59	Work meets minimum criteria
Fail Group	FX – Fail	(45-49) (0-44)	More work required but credit awarded

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

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	Soil conservation	Module Delivery			
Module Type	Department requirements	☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar			
Module Code	DES304				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3 rd Level	Semester of Delivery		
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D.
Module Tutor	Omar Younis Hassan		e-mail	mti.lec224.omar@ntu.edu.iq	
Peer Reviewer Name			e-mail	E-mail	
Scientific Committee Approval Date			Version Number	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Teaching students about the dangers and deterioration to which soil and water are exposed as a result of negligence and poor management, and ways and means of reducing these risks, protecting soil and water from them, and investing them (soil and water) in the correct manner that ensures their sustainability.
Module Learning Outcomes	Cognitive goals Identify and study • Methods of analyzing surface leakage • Water erosion - its concept - types - mechanics • The relationship of erosion to soil productivity • The general equation for wind erosion Course-specific skills objectives. Teaching students about the dangers and deterioration to which soil and water are exposed as a result of negligence and poor management, and ways and means of reducing these risks, protecting soil and water from them, and investing them (soil and water) in the correct manner that ensures their sustainability.
Indicative Contents	1- That what the student studies should be consistent with his inclinations and thinking trends 2- That the student feels the importance of correcting refractive errors in the eye 3- The student should listen carefully to the professor's explanation 4- That the student feels what cognitive excellence and excellence mean 5- That the student recognizes the impact of science and scientists 6- The student must pay attention to respecting the time and class system

Learning and Teaching Strategies	
Strategies	1- Types of communication in the field of work 2- The ability to express and convey ideas clearly and confidently 3- Teamwork.

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	150		

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)	Continuou s	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)	
	Material Covered
Week 1	Introduction - The concept of soil and water conservation Introduction
Week 2	Rain - Types of rain - Physical properties of rain Physics of Rainfall
Week 3	Surface runoff - factors affecting surface runoff
Week 4	Runoff analysis methods
Week 5	Water erosion - its concept - types - mechanics
Week 6	Universal Soil Loss Equation
Week 7	Methods of controlling water erosion
Week 8	The relationship between erosion and soil productivity
Week 9	Wind erosion - its concept - its mechanics
Week 10	The general equation for wind erosion
Week 11	Ways to control wind erosion - Wind Erosion Control
Week 12	Sand dunes and ways to control them Sand Dune
Week 13	The concept of water conservation - methods of water conservation
Week 14	Soil and Water Foundations, permanent and temporary soil and water conservation facilities
Week 15	Soil and water conservation planning
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Practical Syllabus)	
	Material Covered
Week 1	Rainfall data analysis
Week 2	The logical method for measuring the maximum surface flow rate
Week 3	Direct method for calculating the depth of surface turbulence
Week 4	Prediction of water erosion/models based on physical foundations
Week 5	Prediction of water erosion/models based on statistical foundations
Week 6	The general equation for soil loss due to water erosion - the factor K, R
Week 7	The general equation for soil loss due to water erosion - the factor S and L
Week 8	The general equation for soil loss due to water erosion - the factor P and C
Week 9	Applying the general equation for soil loss due to water erosion in the field
Week 10	Slides and films about water erosion
Week 11	A field tour to see the manifestations of water erosion
Week 12	The general equation for wind erosion WEE
Week 13	Applying the general equation for wind erosion (WEE) in the field
Week 14	Films and slides about wind erosion
Week 15	Preparing reports on soil and water conservation

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Fundamentals of Database Systems 6th edition Ramez Elmasri	
Recommended Texts	Data Modeling Fundamentals: A Practical Guide for IT Data Modeling Essentials	
Websites	https://www.pdfdrive.com/	

Grading Scheme			
Group	Grade	Marks %	Definition
Success Group (50 - 100)	A - Excellent	90 - 100	Outstanding Performance
	B - Very Good	80 - 89	Above average with some errors
	C - Good	70 - 79	Sound work with notable errors
	D - Satisfactory	60 - 69	Fair but with major shortcomings
	E - Sufficient	50 - 59	Work meets minimum criteria
Fail Group	FX - Fail	(45-49)	More work required but credit awarded
(0 - 49)	F - Fail	(0-44)	Considerable amount of work required
Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.			

MODULE DESCRIPTION FORM

Module Information				
Module Title	Harvesting of water		Module Delivery	
Module Type	Department requirements		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar	
Module Code	DES305			
ECTS Credits	3			
SWL (hr/sem)	5			
Module Level		3 rd Level	Semester of Delivery	
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq
Module Leader's Acad. Title		lecturer	Module Leader's Qualification	
			Ph.D.	
Module Tutor	Omar ahmed fathi		e-mail	omar.ah.f@ntu.edu.iq
Peer Reviewer Name			e-mail	E-mail
Scientific Committee Approval Date			Version Number	1.0

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

Learning and Teaching Strategies	
Strategies	1- Types of communication in the field of work 2- The ability to express and convey ideas clearly and confidently 3- Teamwork.

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Introducing the student to the concept of water harvesting, the foundations of water harvesting processes, and methods and techniques of water harvesting. Planning and design of harvest lands, water storage and quality of harvest water.
Module Learning Outcomes	Cognitive goals Ability to determine water harvesting methods in dry areas. Learn about increasing the effectiveness of water harvesting in dry areas Study of plants and their relationship to the ecosystem and climate elements in dry areas Identifying plant succession, Iraq's climatic zones, and its environmental types. Course-specific skills objectives. The ability to discuss in a scientific spirit and express what constitutes a study of the subject. The ability to communicate and inquire with the subject teacher Writing reports related to the subject's vocabulary after identifying the scientific sources available in the library on topics related to the environment and dry areas.
Indicative Contents	1- That what the student studies should be consistent with his inclinations and thinking trends 2- That the student feels the importance of correcting refractive errors in the eye 3-The student should listen carefully to the professor's explanation 4- That the student feels what cognitive excellence and excellence mean 5- That the student recognizes the impact of science and scientists 6-The student must pay attention to respecting the time and class system

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.8
Total SWL (h/sem)	150		

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)	Continuou s	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)	
	Material Covered
Week 1	Concept and definition of water harvesting Components of water harvesting systems Importance and benefits of water harvesting
Week 2	Hydrological aspects of water harvesting The hydrological cycle Small hydrological watershed model Hydrological characteristics Frequency analysis and design rainfall Rainfall-runoff relationship Factors affecting runoff Soil type Rainfall characteristics Land cover Slope of the micro-catchment Size and shape of the micro-catchment Runoff models suitable for water harvesting Runoff models for micro-catchment water harvesting Runoff models for macro-catchment water harvesting
Week 3	Methods and techniques in water harvesting Classifications of water harvesting methods Micro-catchment water harvesting methods Rooftop and courtyard systems Suitable surfaces Issues to be addressed On-farm systems Inter-row water harvesting Negarim Meskat Contour bench terraces Small pits Contour bunds and ridges Semicircular and trapezoidal bunds Eye-brow terraces Rectangular bunds Vallerani-type micro-catchments Macro-catchment water harvesting techniques Long-slope water harvesting Hillside conduit systems Limans Large semicircular or trapezoidal bunds Cultivated tanks/reservoirs and hafairs Floodwater harvesting systems Wadi-bed water harvesting systems Off-wadi systems Harvesting water for animal consumption Traditional techniques Modern techniques Contamination concerns
Week 4	Runoff inducement methods Methods of improving runoff Creating shallow channels Clearing the catchment

	Smoothing the soil surface Compacting the soil surface Surface sealing Impermeable coverings Advantages and disadvantages of runoff-inducement methods
Week 5	Identification of areas suitable for water harvesting Parameters for identifying suitable areas Rainfall characteristics Hydrology and water resources Vegetation and land use Topography, soil type and soil depth Socioeconomics and infrastructure Methods of data acquisition Overview Ground truthing Aerial photography Satellite and remote-sensing technology Tools
Week 6	Planning and design of water harvesting systems Soil–water–plant–climate relations Soil Texture and structure Water-holding capacity and soil depth Infiltration rate Crop water requirements Plant and drought Estimating crop water needs Field water budget Rainfall Inter-seasonal distribution of rainfall Design rainfall Need for storage Basic design procedure Selection of site and method Selection of crops Runoff estimation Catchment: Cropping area ratio (CCR) Design examples Optimization of system design Further considerations in area ratio selection Design considerations for trees Design for trees Life-saving harvested water Dimensioning, materials and estimation of quantities Dimensioning and system layout Bund earthwork Earthwork balance
Week 7	Storage of harvested water Soil profile Above ground storage Surface/ground storage Small storage ponds Small farm reservoirs

	Tanks Hafairs Large reservoirs Subsurface/underground storage Cisterns Lining water storage structures Groundwater dams Sand-storage dams Percolation dams Subsurface dams Selection of storage system
Week 8	Concept and definition of water harvesting Components of water harvesting systems Importance and benefits of water harvesting
Week 9	Hydrological aspects of water harvesting The hydrological cycle Small hydrological watershed model Hydrological characteristics Frequency analysis and design rainfall Rainfall-runoff relationship Factors affecting runoff Soil type Rainfall characteristics Land cover Slope of the micro-catchment Size and shape of the micro-catchment Runoff models suitable for water harvesting Runoff models for micro-catchment water harvesting Runoff models for macro-catchment water harvesting
Week 10	Methods and techniques in water harvesting Classifications of water harvesting methods Micro-catchment water harvesting methods Rooftop and courtyard systems Suitable surfaces Issues to be addressed On-farm systems Inter-row water harvesting Negarim Meskat Contour bench terraces Small pits Contour bunds and ridges Semicircular and trapezoidal bunds Eyebrow terraces Rectangular bunds Vallerani-type micro-catchments Macro-catchment water harvesting techniques Long-slope water harvesting Hillside conduit systems Limans Large semicircular or trapezoidal bunds Cultivated tanks/reservoirs and hafairs Floodwater harvesting systems

	Wadi-bed water harvesting systems Off-wadi systems Harvesting water for animal consumption Traditional techniques Modern techniques Contamination concerns
Week 11	Runoff inducement methods Methods of improving runoff Creating shallow channels Clearing the catchment Smoothing the soil surface Compacting the soil surface Surface sealing Impermeable coverings Advantages and disadvantages of runoff-inducement methods
Week 12+13	Implementation, operation, and maintenance of water harvesting systems Implementing water harvesting systems Considerations in implementation Over-design and under-design issues Appropriate technology Operating water harvesting systems Maintaining water harvesting systems Monitoring and evaluation Extension and training
Week 14+15	Socioeconomic issues Social feasibility studies Land-tenure issues Analyzing costs and benefits of water harvesting Costs in water harvesting Benefits of water harvesting Economic feasibility analysis Micro-catchments for field crops Macro-catchments in sub-Saharan Africa Examples from China and India Some general recommendations Integrated approach to planning and management The role of government agencies Community participation Gender representation Farmers as manager The role of experts and donor agencies Adoption or non-adoption of interventions Water harvesting and sustainability in agriculture Resource sustainability Ecological sustainability Social sustainability Other sustainability aspects Economic sustainability Technological sustainability Political sustainability

Delivery Plan (Weekly Practical Syllabus)	
	Material Covered
Week 1	Hydrological graph for catchment area
Week 2	Hydrological characteristics of the area
Week 3	Evapotranspiration precipitations frequency analysis run off computation
Week 4	Run off models for macro and micro catchment
Week 5	Method for water harvesting
Week 6	Method for water harvesting
Week 7	Method to improve run off for catchment area
Week 8	Identification of the catchment area
Week 9	Planning and design of water harvesting system
Week 10	Planning and design of water harvesting system
Week 11	Planning and design of water harvesting system
Week 12	Planning and design of water harvesting system
Week 13	Storage of harvesting water
Week 14	Case study
Week 15	Analysis of cost of water harvesting

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	تقنيات الري الحديثة والري الحقل	
Recommended Texts		
Websites		

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

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

MODULE DESCRIPTION FORM

Module Information			
Module Title	Conditioned Cultivation		Module Delivery
Module Type	B	☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☒ Practical ☒ Seminar	
Module Code	DES 306		
ECTS Credits	6		
SWL (hr/sem)	150		
Module Level	3rd Level	Semester of Delivery	1
Administering Department	Department of Desertification Control Technology	College	Technical Agricultural College
Module Leader	Ahmed Faris Salim	e-mail	ahmedalsawaf@ntu.edu.iq
Module Leader's Acad. Title	lecturer	Module Leader's Qualification	Ph.D.
Module Tutor	Mohammed Salem Ahmed	e-mail	mohameedsa66@ntu.edu.iq
Peer Reviewer Name		e-mail	

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

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. Introducing the student to the types and forms of protected agricultural facilities and nurseries and their benefits. 2. How to control the appropriate conditions for cultivation outside of crop growth times. 3. The student will be able to produce plants from different plant families. 4. Identify methods of vegetative propagation. 5. Study of the physical and chemical problems of seed germination.
Module Learning Outcomes	The student will be able to know:- 1. Benefits of protected agriculture and nurseries, economic evaluation of production in nurseries and protected agriculture, problems and obstacles facing farmers in protected agriculture. 2. Points that must be taken into consideration when building nurseries, greenhouses, and plastic houses, the economics of production in nurseries and protected agriculture compared to open agriculture. 3. The most important features of growing plants in these facilities, how to establish nurseries and greenhouses, types of nurseries and greenhouse structures. 4. Identify the types of systems used to cool greenhouses. 5. Identify the types of systems used to heat greenhouses. 6. Identify the agricultural crops that can be grown within these facilities.
Indicative Contents	Indicative content includes the following. Part A-theoretical: 1. A historical overview of nurseries and protected agriculture, the definition of nurseries and protected agriculture, their benefits, their geographical distribution, and the area covered. 2. Geometric shapes of protected agricultural facilities and nurseries, such as ponds, tunnels, and houses. 3. Methods of climate control inside facilities and their characteristics (air humidity, humidity). 4. Types of materials used in coverage and their characteristics. 5. The effect of terrestrial factors on plant growth and types of agricultural media. 6. What are the types of plastic tunnels and methods of constructing them? 7. Technical specifications that must be followed for greenhouses and the method of constructing them. 8. Methods of heating greenhouses. 9. Methods of cooling greenhouses. 10. Preparing and preparing terraces for agriculture (including preparing the land and sterilizing the soil).

Learning and Teaching Strategies	
Strategies	1. Explanation and clarification 2. Giving lectures 3. Play videos and photos 4. Daily and monthly exams 5. Periodic reports. 6. Field visits for students

Student Workload (SWL)			
Structured SWL (h/sem)	78	Structured SWL (h/w)	5.2
Unstructured SWL (h/sem)	72	Unstructured SWL (h/w)	4.8
Total SWL (h/sem)	150		

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	Material Covered
Week 1	Historical overview, definition of nurseries and protected agriculture, their benefits, geographical distribution and area covered, trends in optimal exploitation, factors influencing development.
Week 2	The foundations of construction, location, direction, area, shape and size, production requirements and production economics.
Week 3	Geometric shapes for nursery and protected agriculture facilities, ponds, tunnels, and houses.
Week 4	Types of materials used in covering and their properties.
Week 5	The effect of climatic factors on plant growth inside protected agricultural facilities (heat, light, gases, humidity).
Week 6	Methods of climate control inside facilities and their characteristics.
Week 7	Methods of climate control inside facilities and their characteristics.
Week 8	Producing vegetable seedlings in nurseries, tunnels and greenhouses.
Week 9	Production of Solanaceae family plants (tomatoes, peppers, eggplant).
Week 10	Production of cucurbit family plants (pumpkin and cucumber).
Week 11	Production of some types of (okra and beans).
Week 12	Mushroom and strawberry production.
Week 13	Production of cut flowers and shade plants.
Week 14	Banana and grape production.
Week 15	Soilless agriculture.

Delivery Plan (Weekly Lab. Syllabus)	
Week	Material Covered
Week 1	Methods to protect against unsuitable weather conditions (heat, light and wind)
Week 2	Types of nurseries and plastic tunnels and methods of establishing them.
Week 3	Technical specifications for greenhouses and how to construct them.
Week 4	Methods of heating greenhouses.
Week 5	Methods of cooling greenhouses.
Week 6	Preparing and preparing nurseries and homes for agriculture (preparing the land and sterilizing the soil).
Week 7	Land planning, determining irrigation lines, connecting irrigation lines, and basic fertilization.
Week 8	Training on methods of producing seedlings inside tunnels and agricultural houses on the ground, planting seeds in a nursery, and planting in containers.
Week 9	Caring for seedlings in the nursery.
Week 10	Training on patchwork crop cultivation and tomato thread winding.
Week 11	Training on irrigation and fertilization of plants.
Week 12	Raising, Plant breeding, and ventilation.
Week 13	Training on disease and insect resistance.
Week 14	Weed control training.
Week 15	Scientific visit.

Learning and Teaching Resources		
	Text	Available in the Library?
	الزراعة المحمية، الدكتور عصام عبدالله بشير 1990 جامعة الموصل	
Recommended Texts	Protected agriculture الدكتور محمود عبد العزيز إبراهيم خليل 2017	No
Websites	https://www.amazon.eg/-/en/ref=nav_logo	

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

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

MODULE DESCRIPTION FORM

Module Information					
Module Title	Water , soil and plant relationship		Module Delivery		
Module Type	Department requirement		☒ Theory ☐ Lecture ☐ Lab ☐ Tutorial ☒ Practical ☐ Seminar		
Module Code	DES 307				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		3 rd Level			Semester of Delivery
Administering Department		Department of Desertification Control Technology	College	Technical Agricultural College of Mosul	
Module Leader	Ahmed Faris Salim		e-mail	ahmedalsawaf@ntu.edu.iq	
Module Leader's Acad. Title		lecturer	Module Leader's Qualification		Ph.D
Module Tutor	Omar Younis Hasan		e-mail	mti.lec224.omar@ntu.edu.iq	
Peer Reviewer Name		Name	e-mail	E-mail	
Scientific Committee Approval Date		01/4/2024	Version Number	1.0	

Relation with other Modules			
Prerequisite module	Siol scince, water scince, plant scince.	Semester	
Co-requisites module		Semester	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	Teaching and introducing students to the physical and chemical relationships between soil and water on the one hand, and soil and plants, and how the chemical and physical properties of the soil affect the properties of soil water and the mechanism of nutrition, absorption, and ionic exchange of nutrients between the soil, the plant, and the soil solution..
Module Learning Outcomes	Important: Write atleast 6 Learning Outcomes, better to be equal to the number of study weeks. A- Cognitive objectives 1- The ability to relate to soil, water and plants. 2- Learn about ways to reuse water in dry areas. 3- Study of plants and their relationship to the ecosystem and climate elements in dry areas 4- Identifying plant succession, Iraq's climatic zones, and its environment types. B- The skills objectives of the course. 1- The ability to discuss in a scientific spirit and express what is involved in studying the subject. 2- The ability to communicate and inquire with the subject teacher 3- Writing reports related to the subject's vocabulary after identifying the scientific sources available in the library on topics related to the environment and dry areas.
Indicative Contents	Types of communication in the field of work The ability to express and convey ideas clearly and confidently Teamwork.

Learning and Teaching Strategies	
Strategies	Theoretical exams (daily, monthly, final) Oral exams Participations inside the hall Homework

Student Workload (SWL)			
Structured SWL (h/sem)	93	Structured SWL (h/w)	6.2
Unstructured SWL (h/sem)	57	Unstructured SWL (h/w)	3.8
Total SWL (h/sem)	150		

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)	Continuou s	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)	
	Material Covered
Week 1	Physical properties of soil and their effect on plant growth
Week 2	Physical properties of soil and their effect on plant growth
Week 3	Chemical properties of soil and their effect on plant growth
Week 4	Chemical properties of soil and their effect on plant growth
Week 5	Chemical properties of soil and their effect on plant growth
Week 6	Soil salinity and its effect on plant growth
Week 7	Soil salinity and its effect on plant growth
Week 8	Mineral nutrition and its relationship to plant growth
Week 9	Mineral nutrition and its relationship to plant growth
Week 10	Water and its relationship to plant growth
Week 11	Water and its relationship to plant growth
Week 12	Water and its relationship to plant growth
Week 13	Water and its relationship to plant growth
Week 14	The various stresses to which the plant is exposed
Week 15	The various stresses to which the plant is exposed

Delivery Plan (Weekly Practical Syllabus)	
	Material Covered
Week 1	Methods for estimating water potential in leaves (plants)
Week 2	Methods for estimating water potential in leaves (plants)
Week 3	Comparing the growth and development of root systems in soils of different textures
Week 4	Comparing the growth and development of root systems in soils of different textures
Week 5	The effect of soil bulk density on root growth and development
Week 6	The effect of soil bulk density on root growth and development
Week 7	The effect of soil bulk density on root growth and development
Week 8	Estimating the potential of water in soil and soil and finding a relationship between them
Week 9	Estimating the potential of water in soil and soil and finding a relationship between them

Week 10	The effect of ventilation on root growth and their efficiency in absorbing ions
Week 11	The effect of ventilation on root growth and their efficiency in absorbing ions
Week 12	Measuring the daily transpiration rate of different plants
Week 13	Measuring the daily transpiration rate of different plants
Week 14	Measuring the effect of total leaf area and root system efficiency on transpiration rate
Week 15	Measuring the effect of total leaf area and root system efficiency on transpiration rate

Learning and Teaching Resources		
	Text	Available in the Library?
Required Texts	Required prescribed books Electronic references, Internet sites...	
Recommended Texts	Recommended books and references (scientific journals, reports,....)	
Websites	Electronic references, Internet sites...	

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

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