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ERASMUS+

HIGHER EDUCATION CAPACITY BUILDING

Erasmus+ Project

New curricula in Precision Agriculture using GIS technologies and sensing data

(CUPAGIS)

COURSES/PROGRAMM DESCRIPTION

Name of the program: **Precision Agriculture**

University: **University of Ibn Khaldoun Tiaret UIK**

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Program title: Remote Sensing and Application of Earth and Environment related PA	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 08	**Teaching language:** English , French
Contact (email): Dr Kaddar Bachir. kaddarbachir@gmail.com	

Program Description:

1. Fondamentals of remote sensing
2. Sensors
3. Satellite-based Sensors in Visible and Infrared Wavelengths
4. Active Sensors: Radar and Lidar
5. Image processing, analysis, interpretation
6. Remote Sensing Applications

Objectives:

- Remote Sensing Data Collection, processing, and analysis
- Remote Sensing Application
- Data acquisition process Date processing
- Data analysis and interpretation to numerate
- Remote sensing platforms and sensors Corresponding images and their characteristics
- Image processing and analysis techniques to recognize
- Physical principles of the visible, infrared and microwave section of the electromagnetic spectrum
- Different satellites and the corresponding image
- To give examples of Remote sensing applications

Prerequisites:

- Basic Concepts of image data processing and analysis
- Programming Fundamentals.
- Basic Concepts of image data processing and analysis
- Physical principles of the visible, infrared and microwave section of the electromagnetic
- spectrum Remote sensing platforms and sensors
- Data acquisition, storage and processing Image processing and analysis
- Remote sensing applications in agriculture

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Program title: Yield sensors for Precision Agriculture	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Dr.Ghellab abdelkader Email: ghabdelkader@yahoo.fr	

Program Description:

General information on precision agriculture. Definitions and their

Use of yield sensors.

Main components, equipment status and adjustments.

Production of yield maps

Configuring Basic Software Settings, Methods for Grouping Yield Values. Number of intervals and choice of colors.

Interpretation of performance maps

Multi-year maps, Causes explaining yield variability, Decision making, Performance maps as a validation tool.

Data acquisition and communication

Digitation, Acquisition Systems, Calibration, Wireless Sensor Networks.

Classification of the sensor system. According to the measurement principle, According to the measured variable, Depending on the distance to the target (in contact, proximal, airborne, spatial).

Sensors used for precision agriculture. Crop sensing, Soil sensing, Microclimate sensors (rainfall, temperature, humidity,leaf wetness, etc.). Machinery sensor (fuel consumption, draft forces, seeding condition, traceability, etc.).

Other sensors

Photometric sensors, temperature sensors, flow sensors, level, humidity, strain sensors, force and pressure, rotational speed sensors. Photoresistor, photodiode, phototransistor.

Objectives: Sensors play a great role for improving precision agriculture. By basing on them to assemble the information in real time, so we can make constructive decisions to improve and optimize the production of agriculture. The objective of the course is to provide knowledge on a complete measurement chain starting from measurement until the use of measured quantities

Prerequisites:

- Electrical and electronic measurements
- Signal processing.

Possess :

- General Electricity and electronic.
- Basic Laws of Physics.

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Program title: Basics of the Precision Agriculture	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 05	**Teaching language:** English , French
Contact (email): Prof. DELLAL Abdelkader **Email:** dellal05_aek@yahoo.fr	

Program Description:

1. Assumptions, technical possibilities
2. Satellite Guidance, -use of Navigation Devices, Other Navigation options
3. Technique for measuring and mapping yields of field crops
4. Sensors, measurement principles, Geographical instruments
5. Remote sensing : Data processing and interpretation
6. Methodogical aspects of soil sampling- Spatial variability of soil properties
7. Geographical Information System and data management
8. Robotics and autonomous systems in agriculture, Smart Farming

Objectives:

This unit will allow students to know the physical properties of the soil and its impact on agricultural yield, using mapping and GIS of soil properties

Prerequisites:

Soil science
- Fertility and irrigation of soil
-soil properties and mapping yields
Possess:

- GIS, web technologies...etc

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Program title: Agricultural statistics and experimentation	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 04	**Teaching language:** English , French
Contact (email): Prof. Maatoug M Email: maatoug_m@univ-tiaret.dz	

Program Description:

* General Problems of Field Experimentation
* Graeco devices - latin square design
  * Graeco device - Latin square
  * Lattice device
  * Split PLOT device
  * The "block" system
  * The "Latin square" device
  * Complex devices
  * The "Total Randomization" features
  * Application conditions for analysis of variance
  * Interpretation of the results of the analysis of variance
  * Analysis of Covariance
* Multidimensional analyses (multiple regressions, logistics, ACP, AFC, CHA...etc.)

Objectives:

Statistical methods are indispensable for any data processing. The multidimensional analysis part introduced in this program is a prerequisite for the modules (Machine learning, AI, Image precessing, etc.)....

Prerequisites:

In the form of subjects already described, and/or a brief description of the knowledge required to be able to follow this teaching. This course is a preamble to the modules of S3

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Program title: Plant Ecophysiology	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Dr.Maamar Benchohra Email: maamar benchohra benchohra_19@hotmail.fr	
Program Description: Part One: PLANT NUTRITION AND METABOLISM • Water nutrition • Mineral nutrition • Plant metabolism (carbon nutrition) Second part: GROWTH AND DEVELOPMENT OF THE PLANT.	
Objectives: This unit will allow the student to study the biotic and abiotic mechanisms that govern the functioning and development of plants in the environment, and its interactions with the environment. It is the subject of knowing the nutrition and metabolism of the plant, the elements essential to his life and the transformation of these elements and their integration into organic matter (in biomass).	
Prerequisites: A good knowledge of vegetable biology , general agriculture , fertilization and also meteorology	

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Program title: General agriculture	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Dr.Bouacha mohamed islem Email: islem2989@yahoo.com	
Program Description: 1. General concepts 2. The cultivated plant and its environment : 3. The agricultural plant: 4. Crop cycles and conduct : 5. Fertilization 6. Optimization of agriculture through new technologies:	
Objectives: The aim of this course is to present and familiarize the students with the main aspects of agriculture and to describe the main variables prior to precision agriculture.	
Prerequisites: Good knowledge of plant biology, pedology and ecophysiology; necessary for the advent of the course	

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Program title: Soil physic properties and its measurement	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 04	**Teaching language:** English , French
Contact (email): Prof.Dellal Abdelkader Email: dellal05_aek@yahoo.fr	
Program Description: • Characteristics of a porous medium • Water Retention and Potential in Soils • Water flow in saturated and unsaturated media • Techniques for characterizing water content, water potential and hydraulic conductivity • Introduction to solute transfer • Gas and heat transfer in soils - Soil mechanics	
Objectives: Objective of this module is to understand the mechanisms that govern the different flows liquids and gases in soil, and to understand water movements in soil.	
Prerequisites: Good knowledge of basic of soil sciences	

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Program title: Algorithmic and data structure.	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Dr.Mansouri Dou El Kifl Email: Douelkifl31@hotmail.com	
Program Description: • Simple Sequential Algorithm • Conditional Structures (in Algorithmic Language and in Pyton) • Loops (in algorithmic language and in Pyton) • Tables and Strings and custom Types • Subroutines: Functions, Procedures and Files	
Objectives: This course gives This course gives the bases of the algorithmic and the programming, it is necessary for the continuation of the various modules proposed "web technologies ...."	
Prerequisites: To know Notions on mathematics, on mathematical logic and computer science Possess : basis of mathematics and logic	

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Program title: Electrical and electronic measurements	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Dr.OUARED Rahal Email: ouaredrahal14@hotmail.fr	

Program Description:

1. Fundamentals of Measurement
2. Construction of a measuring device
3. Classification of Electrical and Electronic Measuring Devices
4. Principles of operation of measuring devices
5. Electrical Measurement Methods
6. Measuring in the industry

Objectives:

The objective of this course is the study of the digital measurement system, associated electronics and than the different types of sensors.

Prerequisites:

To know:

- General Electricity
- Electrical and electronic measurements

Possess:

Basic Electronics.

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Program title: Global Navigation Satellite System (GNSS)	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03.5	**Teaching language:** English , French
Contact (email): Dr.Otman Abdelkader Email: otmanekadeur@outlook.fr	

Program Description:

Chapter I : Fundamental of NAVIGATION

Chapter II :

- GNSS Systems
- Space Segment Elements
- Control Segment Elements
- NAVSTAR, GLONASS, GALILEO, BEIDOU navigation systems
- Position Determination Techniques

Objectives:

The course covers all the process of GPS, and Global Navigation Systems like NAVSTAR, GLONASS, GALILEO

Prerequisites:

To know:
- Mathematics of GPS
- 3D Geometry.

Possess:
Mathematical Co-ordinate transformations

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Program title: Signal processing	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Pr.Allaoui Tayeb Email: Allaoui_tb@yahoo.fr	
Program Description: 1. Reminders of Key Results of Signal Theory 2. Random Processes 3. Analysis and Synthesis of Analog Filters 4. Sampling Signal 5. Discrete Transforms	
Objectives: Familiarize the student with digital signal processing techniques such as analysis spectral and digital filtering.	
Prerequisites: To know: ▪ Signal Theory. ▪ Basic Electronics. Possess: ▪ Mathematics. ▪ Probability and Statistics.	

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Program title: **Artificial Intelligence**	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 03	**Teaching language:** English , French
Contact (email): Ahmed SIABDELHADI Email: Ahmed Siabdelhadi ahmed.siabdelhadi@gmail.com	
Program Description: **Representation of knowledge** -Logical representations -Graphical representations: semantic networks, ontologies **Solving problems** - Formalization - Research and control methods **Logic programming and expert systems** - The Prolog language - Syntax and data structures - cutoff operator - The problem of negation in PROLOG: the closed world hypothesis and the negation by failure. - Use of the resolution method in the machine implementation of this type of language.	
Objectives: Inculcate to the student basic notions in artificial intelligence such as the nature of AI, the representation of knowledge, solving problems, etc. Logic programming and expert systems are also discussed to make this teaching practical.	
Prerequisites: Notion of algorithmic and programming. Basics of Internet and Networks	

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Program title: Agrometeorology	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 1
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 02	**Teaching language:** English , French
Contact (email): Pr.Rezzoug Wafa Email: Rezzougwafa@yahoo.fr	
Program Description: **Basic Climatological Data: Climate Elements and Factors** : - Physical properties of air: thermodynamics of moist air, adiabatic transformations and applications, air stability; - wind dynamics: General circulation, geostrophic and thermal winds; - air mass formation, the polar front and its perturbations . **Micrometeorology** - Solar radiation ; - elements of atmospheric turbulence and energy exchanges near the ground; - wind and temperature structure in the lower atmosphere, night-time minimum temperature.	
Objectives: This unit will allow the agronomist student to study the parameters of the climate and its impact on agricultural production. It will also allow the study of some weather forecast models in relation to agricultural science	
Prerequisites: Soil Science, Thermodynamics, Data Analysis	

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Program title: Start-up initiatives for future farmers	**University: UIK**
Degree: master's degree	**Standard period of study:** Semester 2
Web link of the university: www.univ-tiaret.dz	
Web link of the program: https://www.univ-tiaret.dz/cupagis/	
Credit points (ECTS): 02.5	**Teaching language:** English , French
Contact (email): Ounes Mohamed Email: senou13@hotmail.com	

Program Description:

1) presentation of the company :

-Definition
-Organization of the company
-Typology and classification of companies
-The different functions of the company
- The procurement function
- The production function
- The accounting function
-Sales and marketing function

2) Setting up a project :

A) The contractor:
- Interpersonal relationship
- personal characteristics
- Objective setting
-Problem solving

B) The project
- The choice of the project (macro and micro selection)
- Strategic Analysis of Project Selection (SWOT Matrix)
- The business plan
-Market research
- Technical study of the project
- Financial study
- Performance Indicators

Objectives:

The aim of the course is to teach students ways and possibilities of creating small and new start-up in the field of farming and precision agriculture.

Prerequisites:

Economy , precision agriculture.