

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

**MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH**

HARMONIZATION

MASTER TRAINING OFFER

ACADEMIC

Establishment	Faculty	Department
Djilali Bounaâma University of Khemis-Miliana	Natural and Life Sciences and Earth Sciences	Agronomy

Field: Natural and Life Sciences

Branch: Agronomic Sciences

Speciality: *Hydro-agricultural infrastructures*

الجمهورية الجزائرية الديمقراطية الشعبية

وزارة التعليم العالي والبحث العلمي

مواعمة عرض تكوين ماستر أكاديمي

القسم	الكلية	المؤسسة
الزراعة	كلية علوم الطبيعة والحياة وعلوم الأرض	جامعة جيلالي بونعامة خميس مليانة

الميدان: و الحياة الطبيعة علوم

الشعبة: فلاحية علوم

التخصص: التهيئة المائية الفلاحية

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**I – Master’s identity card
(All fields must be completed)**

1 - Location of training:

Faculty: Faculty of Natural and Life Sciences and Earth Sciences

Department: Agronomy

2- Training partners *:

- Other academic institutions:

- National School of Agronomy of El-Harrach (ENSA)
- Blida University
- Blida National School of Hydraulics (ENSH)
- University of Chlef

Companies and other socio-economic partners:

- The National Agency for Hydraulic Resources (ANRH)
- The National Office of Irrigation and Drainage (ONID)
- National Institute of Irrigation and Drainage (INSID)
- Institut National de Recherche Agronomique (INRA)
- Technical Institute of Field Crops (ITGC)
- Wilayas Hydraulic Directorates and Subdivisions
- The Environment Directorates
- Agence Nationale des Barrages (ANB)
- National Board of Sanitation (ONA)
- The Watershed Agency
- Foresti re National Research Institute (I N R F)
- Private Research Offices
- Pilot Farms
- Chambers of Agriculture

Faculties and Laboratories

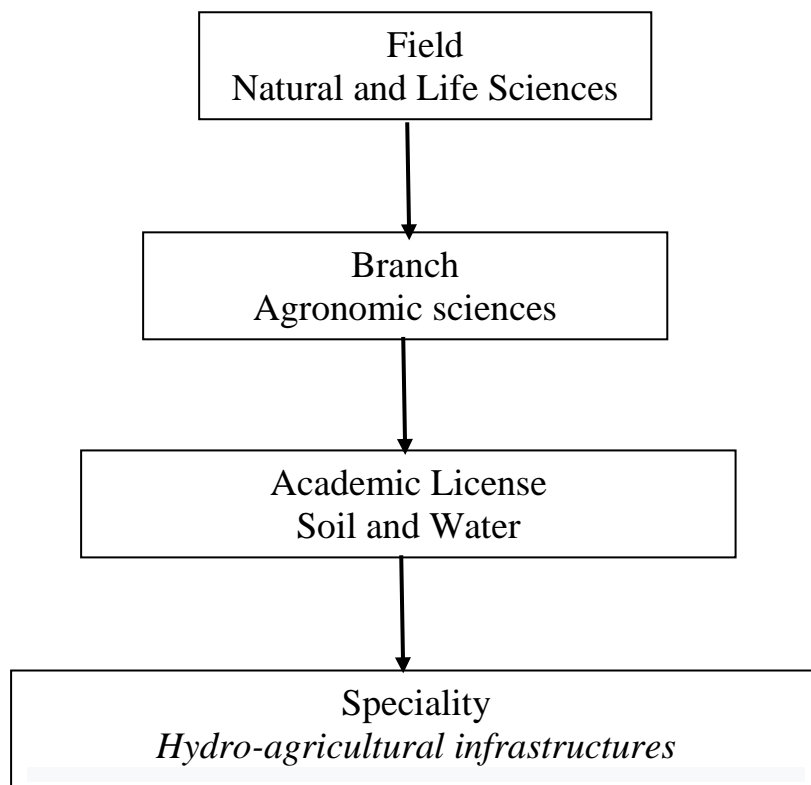
- Faculty of Natural and Life Sciences and Earth Sciences
- Faculty of Technology of the Djilali Bounaama University of Khemis-Miliana-Laboratory -
- Eau-Roche-Plante of the Djilali Bounaama University of Khemis-Miliana

- International partners

* Present agreements as an appendix to training

3 – Training Context and Objectives

A – General organization of training: project position



A – Conditions of access (indicate the license specialties that can give access to the Master)

This training is reserved for students enrolled in the common core of life and earth sciences with a degree: **Academic licence in Soil and Water**

B - Objectives of the training (competences concerned, pedagogical knowledge acquired at the end of the training- maximum 20 lines)

This project is part of the new special opening in the field of nature, life and earth sciences for the benefit of students pursuing their studies in the LMD system. Among the major problems requiring skills and know-how in the field of irrigation in this region are:

- 1- The severe drought that increasingly characterizes this perimeter and which requires the rational use of water to meet the increased water needs of crops
- 2- The increase of agricultural areas in intensive system following the support of the state of several irrigation projects in the Wilaya and at the national level under the PNDA.
- 3- Silting dams where we should find alternatives as small hydraulics (collinair holds e)
- 4- The quality of the water is not always satisfactory.

5- Problems of pollution of surface water, mainly surface water, caused by various discharges and pollution of ground water by intensive agriculture are not excluded. Any use without risk to human health therefore requires regular physico-chemical and microbiological characterizations of these waters.

6- Groundwater pollution from intensive agriculture

In order to meet the need for skills to deal with the above problems by future managers in the sector, we have just presented this preliminary draft

The main objectives of this training are summarized as follows:

- Upgrading irrigation water for wealth creation
- Design and installation of irrigation and drainage networks
- Technical management of irrigated areas
- Optimisation and economic efficiency of irrigation networks
- Implementation of rural development
- Rational and sustainable exploitation of agricultural potential
- Protection of irrigated perimeters against degradation.
- Monitoring soil pollution levels and water resources
- Achieve economically significant and regular production thresholds in the agricultural sector
- Development of new agricultural land

These executives will develop the following skills:

- *Optimization of irrigation water resources management
- * Irrigation water quality monitoring
- *Rural development completed
- * Search for the causes of degradation of perimeters
- *Undertake perimeter protection actions
- * Drought and temporary flood control
- * Combating water pollution
- * Participate in the sustainable development of irrigated areas
- *Land development and development
- * Irrigation water treatment
- * Design and construction of irrigation and drainage networks.
- * Integration into scientific research in this field.

C profiles and skills ; trades concerned (in terms of job integration - maximum 20 lines):

The present Master's course within the framework of the development of the various specialties in the field of nature and earth sciences of the faculty. This two-year master's degree allows to train specialists in water sciences in agriculture.

These executives will develop the following skills:

- Land development and development
- Optimising the use of irrigation water resources
- Monitoring of irrigation water quality
- Implementation of rural development
- Research the causes of degradation of perimeters

- Undertake perimeter protection actions
 - Drought and temporary flood control
 - Combating water pollution
- Treatment of irrigation water
- Participate in the sustainable development of irrigated areas
 - Design and construction of irrigation and drainage networks
 - Integration into scientific research in this field.
 - Integration into entrepreneurship (consultancy and small business)

D- Regional and national employability potential of graduates

Algeria has large irrigated areas in the north and south which play an important role in agricultural activity and job creation. The Haut Chélif perimeter is among the oldest and largest perimeters. It belongs to the Wilaya of Ain-Defla. It is linked to the two other medium and low Cheliff perimeters, together constituting the Cheliff valley. The valley is part of the administrative territory of the wilayas of Chleff and Relizane.

At the national and wilaya level, there is an important administrative system and public or private structures in the rural engineering sector. This training can provide the skills required by these structures. Future graduates can therefore apply for jobs in the following sectors:

Irrigation and drainage boards

Irrigation and drainage institutes

Agricultural research institutes

Hydraulic directions

Departments of the environment

Hydraulic subdivisions

The cities,

The National Agency for Hydraulic Resources

The National Dams Agency

Watershed agencies,

Design offices

The realization companies

Departments of Agriculture of the Wilaya

Wilaya environmental inspections

The water resources laboratories of the Wilayas

E – Gateways to other specialties

- Development and development of the soil
- Water treatment

F – Training monitoring indicators

During the training, the student must receive continuous supervision enabling him to

Immerse yourself in the world of work through short-term internship outings in the various structures related to your specialty.

The student will be accompanied to achieve:

- Research on specific information topics and present them in order to animate a scientific debate in groups. This would allow an enrichment of general knowledge and the improvement of scientific communication among students.
- Mini-projects to initiate students to concretize their know-how
- Internships which constitute a first step of professional impregnation The evaluation of these internships would make it possible to appreciate the level of methodology of analysis and synthesis of the students
- An end-of-study dissertation carried out under the supervision of a supervisor will be defended before a specialist jury in the field. The evaluation of the dissertation will focus on the points:





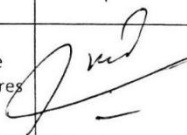
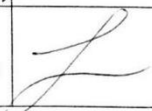
- ♣ Originality of the subject
- ♣ Presentation of the document
- ♣ Quality of the presentation
- ♣ Study methodology
- ♣ Understanding
- ♣ Analysis and synthesis





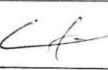

G – Supervisory capacity

20 students

4 – Human resources available

A : Teacher of the establishment intervening in the specialty

Nom, prénom	Diplôme graduation + Spécialité	Diplôme Post graduation + Spécialité	Grade	Type d'intervention *	Emargement
MOKABLI Aissa	Ingénieur d'état En Agronomie (Phytotechnie)	Doctorat d'état Sciences agronomiques Zoologie	Prof	Encadrement stage Encadrement mémoires	
MEROUCHE Abdeikader	Ingénieur d'état Hydraulique Agricole	Doctorat Sciences agronomiques En hydraulique Agricole	MCB	Cours –TD-TP Encadrement stage Encadrement mémoires	
Bouderbala Abdelkader	Ingénieur d'état En Hydraulique	Doctorat Hydraulique	MCB	Cours - TD – TP Encadrement stage Encadrement mémoires	
SADOUNE Ali	Ingénieur d'état En Géologie	Doctorat En cristallographie	MCB	Encadrement stage Encadrement mémoires	
Djezar Miliani	Ingénieur d'état En Agronomie (phytotechnie)	Doctorat Sciences agronomiques En Zoologie Aquatique	MCB	Encadrement stage Encadrement mémoires	
BOUSSALHIH Brahim	Ingénieur d'état En Agronomie (phytotechnie)	Doctorat Sciences agronomiques En amélioration des plantes	MCB	Cours - TD – TP Encadrement stage Encadrement mémoires	

KARAHACANE Tahar	Ingénieur d'état En Agronomie (Phytotechnie)	Doctorat Sciences agronomiques En Zoologie	MCB	Encadrement stage Encadrement mémoires	
BOUGARA Mohamed	Ingénieur d'état En Géologie	Doctorat En Sedimentation Techtonique	MCB	Encadrement stage Encadrement mémoires	
KARAHACANE Hafsa	Ingénieur d'état Hydraulique Agricole	Magister En Hydraulique Agricole	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	
MOKRANE Kadir	Ingénieur d'état Hydraulique Agricole	Magister En Hydraulique Agricole	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	
Amrani Rachid	Ingénieur d'état Hydraulique Agricole	Magister En Sciences de l'eau et Bioclimatologique	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	
Bouaichi ilhem	Ingénieur d'état En Hydraulique	Magister En Génie Rural	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	
ABDESSELAM Boualem	Ingénieur d'état En Agronomie (Pédologie)	Magister En Pédologie	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	
BENSAADA Mohamed	Ingénieur d'état En Hydrogéologie	Magister En Hydrogéologie	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	
SADEUK Benabbes	Ingénieur d'état Hydrogéologie	Magister Hydrogéologie	MAA	Cours - TD - TP Encadrement stage Encadrement mémoires	

5- Specific material resources available

Pedagogical Laboratories and Equipment: Sheet of existing pedagogical equipment for the practical work of the planned training (1 sheet per laboratory)

Laboratory entitled : Physics

Capacity in student: 20

N°	Equipment title	Number	comments
01	Uncertainty	05	
02	Newton's second law	02	
03	Rectilinear motion	02	
04	The stiffness of a spring	05	
05	Free fall	01	
06	Electric fields and potential	04	
07	Oscilloscope	04	
08	ohm's law	04	
09	Electricity uncertainty	04	
10	Charging and discharging a capacitor	04	
11	RLC Circuit	04	

Laboratory entitled : Chemistry

Capacity in student : 20

N°	Equipment title	Number	comments
01	aboratory ph meter	02	
02	Laboratory conductivity meter	02	
03	Ph-put portable	02	
04	Portable conductivity meter	02	
05	Oven	01	
06	Flame Photometer	01	
07	Balloon heater	02	
08	Hotplate	02	
09	portable scale	02	
10	Analytical balance	01	
11	Electronic thermometer	04	
12	Vacuum pump	02	
13	Visible UV Spectrophotometer	01	
14	gas chromatograph	01	
15	Portable oximeter	01	
16	Water bath	01	
17	Case for water analysis	01	

N°	Equipment title	Number	comments
01	Hematocrit	05	
02	Microscope	02	
03	Hotplate	01	
04	Electronic scale	04	
05	PH meter	liste	
06	Chromatography tank	liste	
07	Electrophoresis	01	
08	Centrifuge	03	

Laboratory entitled : Biochimistry

Capacity in student : 20

Laboratory entitled : Biology

Capacity in student : 20

N°	Equipment title	Number	comments
01	Autoclave	02	
02	Water bath	01	
03	Incubator oven	02	
04	Chromatography tank	03	
05	Microscope	12	
06	Magnifying glass	10	
07	Microtome	20	
08	Steamroom	01	
09	Potometer	01	
10	Distiller	01	
11	Analytical balance	01	
12	Water bath	01	

Laboratory entitled : Hydraulic

Capacity in student : 20

N°	Equipment title	Number	comments
01	Venturi tube	01	
02	Losses pressure measuring device	02	
03	Rain Simulator	01	
04	Flow Regime Apparatus	01	
05	Hydraulic Channel	01	
06	Center of thrust	01	
07	Device orifices	01	
08	Permeameter at constant charge	01	
09	Field infiltrometer	01	

10	Precision scale	01	
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Laboratory entitled : Geology Cartography

Capacity in student : 20

N°	Equipment title	Number	comments
01	Manual Curvimeter	05	
02	Digital curvimeter	02	
03	Planimeter	01	
04	Compass	04	
05	Geological maps	Liste	
06	Topographic maps	Liste	
07	Double decameter	01	
08	Caliper	03	
09	Electric probe	02	
10	Digitization table	01	
11	Manual Curvimeter	05	
12	Digital curvimeter	02	
13	Planimeter	01	
14	Compass	04	
15	Double decameter	01	
17	Electrical probe	02	

Laboratory entitled : Soil

Capacity in student : 20

N°	Equipment title	Number	comments
01	Auger	02	
02	Crusher	01	
03	Precision scale	01	
04	Robinson pipet	01	
05	Mechanical stirrer	01	
06	Magnetic agitator	01	
07	Centrifuge	01	
08	Field infiltrometer (double rings)	01	
09	Tensiometer	01	
10	pH meter	01	
11	Flame Photometer	09	
12	Mineralizer	01	
13	spectrophotometer	01	
14	Sieve series	02	
15	Conductivity meter	02	
16	Buchi for Nitrogen	03	



17	GPS	01	
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B- Internship sites and in-company training:

- ♣ Experimental land of the university
- ♣ Wilaya Pilot Farms
- ♣ National Irrigation and Drainage Office (ONID)
- ♣ Stations of the Institute of Irrigation and Drainage (INSID)
- ♣ Station of the National Agency for Water Resources (ANRH)
- ♣ Water Directorate (DE)
- ♣ Dam Agency
- ♣ Private farms

C- Master's support research laboratory (ies):

<< **Water-Rock-Plant** >>

Chef du laboratoire <i>Lazali Mohamed</i> N° Agrément du laboratoire : <i>303</i>	
Date : <i>03/12/2003</i> Avis du chef de laboratoire : <i>A. F.</i> 	

D- Master's support research project(s):

E- Personal workspaces and ICT:

The library has extensive documentation in the following areas

Mathematics, Chemistry, Biochemistry, Microbiology, Electricity, Biology, Plant and Animal Physiology, Anatomy, Genetics, General Hydraulic Hydrostatics, Hydrogeology, Agronomy, Irrigation Drainage, Soil Science, Economics, Remote Sensing and GIS, Economics, English Law, French and Memoirs of end of study.

II- half-yearly organization sheet

(Please submit the sheets for the 4 semesters)

Semester 1

Teaching Unit	OHV	Weekly hourly volume				Coeff	Credits	Assessment method	
	15 week	C	TD	TP	TNPHV			continuous	Exam
Fundamental Teaching Unit									
FTU 1 : Hydraulic 1, Irrigation systems and calculation bases	135	3	3	3	165	6	12		
Hydraulic 1	67h 30	1h 30	1h 30	1h 30	82,5	3	6	X	X
Irrigation systems and calculation bases	67h 30	1h 30	1h 30	1h 30	82,5	3	6	X	X
FTU 2 : Applied hydrology	67,5	1,5	1,5	1,5	82,5	3	6		
Applied hydrology	67h 30	1h 30	1h 30	1h30	82,5	3	6	X	X
Methodological Teaching Unit									
MTU : Soil science and development, Water quality in Agriculture	105	3	1	3	120	5	9		
Soil science and development	60	1h30	1h	1h30	90	3	5	X	X
Water quality in Agriculture	45	1h30		1h30	30	2	4	X	X
Discovery Teaching Unit									
DTU : Water and climate change	45	1,5	1,5		3,75	2	2		
Water and climate change	45h	1h30	1h30		3,75	2	2	X	X
Transversale Teaching Unit									
TTU : Communication	22,5	1,5			3,75	1	2		
Communication	22h30	1h30			3,75	1	2	X	X
Total semester	375				375	17	30		

Semester 2

Teaching Unit	OHV	Weekly hourly volume				Coeff	Credits	Assessment method	
	15 week	C	TD	TP	TNPV			continuous	Exam
Fundamental Teaching Unit									
FTU 1 :Hydraulic, Agricultural drainage and dimensioning	135	4,5	3	1,5	165	6	12		
Hydraulic 2	67h30	1h30	1h30	1h30	82,5	3	6	X	X
Agricultural drainage and dimensioning	67h30	3h	1h30		82,5	3	6	X	X
FTU 2 :Catchments Mapping	67,5	3		1,5	82,5	3	6		
Catchments Mapping	67h30	3h		1h30	82,5	3	6	X	X
Methodological Teaching Unit									
MTU1 :Applied statistics, Geographic information systems	82,5	3	1,5	1	67,5	4	6		
Applied statistics	45	1h30	1h30		30	2	3	X	X
Geographic information systems	37h30	1h30		1h	37,5	2	3	X	X
MTU2 : Agriculture and sustainable developpement	22,5	1,5			52,5	1	3		
Agriculture and sustainable developpement	22h30	1h30			52,5	1	3	X	X
Discovery Teaching Unit									
DTU : English	45	1,5		1,5	3,75	1	2		
English	45h	1h30		1h30	3,75	1	1	X	X
Transversale Teaching Unit									
TTU :Legislation	22,5	1,5			3,75	1	1		
Legislation	22h30	1h30			3,75	1	1	X	X
Total semester	375				375	17	30		

Semester 3

Teaching Unit	OHV	Weekly hourly volume				Coeff	Credits	Assessment method	
	15 week	C	TD	TP	TNPHV			continouous	Exam
Fundamental Teaching Unit									
FTU 1 : Pump station, Irrigation scheduling and automatisation,	135	4,5	3	1,5	165	6	12		
Pump station	67h30	3h	1h30		82,5	3	6	X	X
Irrigation scheduling and automatisation,	67h30	1h30	1h30	1h30	82,5	3	6	X	X
FTU 2 :Anti-erosion installations	67,5	1,5	1,5	1,5	82,5	3	6		
Anti-erosion installations	67h30	1h30	1h30	1h30	82,5	3	6	X	X
Methodological Teaching Unit									
MTU :Pollution et environnement, Maintenance and rehabilitation of systems	105	4,5	1	1,5	120	5	9		
Pollution et environnement	60k	1h30	1h	1h30	90	3	5		
Maintenance and rehabilitation of systems	45h	3h			30	2	4	X	X
Discovery Teaching Unit									
DTU : Technical English	45	1,5	1,5		3,75	2	2		
Technical English	45h	1h30	1h30		3,75	2	2	X	X
Transversale Teaching Unit									
TTU :Entrepreneurship	22,5	1,5			3,75	1	1		
Entrepreneurship	22h30	1h30			3,75	1	1	X	X
Total semester	375				375	17	30		

Semester 4

Internship in a company sanctioned by a thesis and a defense.

	VHS	Coef	Credits
Personal Work			
Internship in a company	250	5	10
Seminars			
Other (Supervision)	500	10	20
Total Semester 4	750	15	30

5- Global summary of the training: (indicate the separate global VH in course, TD and TP to 04 teaching semesters, for the different teaching units type)

HV \ TU	FTU	MTU	DTU	TTU	Total
Course	270	180	67,5	67,5	585
TD	180	52,5	45	0	277,5
TP	157,5	82,5	22,5	0	262,5
Personal Work	742,5	360	11,25	11,25	1125
Work experience	500	250			750
Total	1850	925	146,25	78,75	3000
Credits	74	37	06	3	120
% credits for each TU	61,20	30,80	5	2,5	100

III - Detailed program by matter
(1 detailed sheet per Matter)

Master Title : Hydro-agricultural Infrastructures

Semester : 1

Unit title:FTU1

Mattertitle : Hydraulic 1

Credits : 6

Coefficients : 3

Teaching objectives: Mastery of hydrostatics, calculation of head losses, understanding of flows under load and introduction to calculations of irrigation networks.

Recommended prerequisites: Students should have basic knowledge of applied physics and mathematics.

Mattercontent:

1. Reminders of the mechanics of incompressible fluids

- Hydrostatic
- Momentum theorem,
- Bernoulli's theorem

2. General information on loaded flows

- Classification of flows under load
- flow regimes

3. Study of pressure drops

- Linear pressure drops
- singular head losses

4. Calculation of flow under load

- Flow systems,
- law of nodes, laws of sections, pressures and velocities, piezometric lines and load lines

5. Calculation and simulation of networks

- Tracing a network,
- dimensioning of a ramified network,
- simulation of mesh networks

6. Elements of a water distribution system

- Tanks,
- Accessories (valves, non-return valve, regulator, flow limiter, irrigation terminals, etc.)

7. Non-permanent flows

- Analysis of the water hammer phenomenon
- Equation of the phenomenon,
- Solving method
- Maximum water hammer values,
- Protection of discharge lines

Tutorials :

- Hydrostatic,
- Flow regimes
- Load losses,
- Calculation of pressures and velocities in pipes
- Network sizing,
- Reservoir sizing,
- Calculation of anti-ram tanks)

Practical work:

- Venturi tube
- Flow regimes (Reynolds experiment)
- Load losses

Study outing

See the components of a hydraulic network and anti-water hammer reservoirs

Non-face-to-face personal work

- Mini-project on the calculation of total pressure losses in a ramified and meshed network.

Assessment method: Continuous and Exam

References :

- Armendo Lencastre, 2005 : Hydraulique générale,
- Michel Carlier, 1986 : Hydraulique générale et appliquée,
- Jacques Bonnin , 1982, Hydraulique urbaine
- Saad Bennis ,2009 Hydraulique et hydrologie
- Morice Cassan 1998 Aide memoire hydraulique souterraine
- Boualem Remini , 2005 Hydraulique appliquée

Master Title : Hydro-agricultural Infrastructures

Semester: 1

Unit title: FTU1

Mattertitle: Irrigation systems and calculation bases

Credits: 6

Coefficients: 3

Teaching objectives: Study and design of different irrigation systems and irrigation management

Recommended prior knowledge: Fundamentals of irrigation, soil science, general hydraulics, applied mathematics

Matter content:

1 Study of water-soil-plant relationships,

- Retention forces
- Potential of water in the soil
- Critical humidity levels
- Soil water retention curve (Pf)

2 General principles of the different irrigation systems and subsystems-

Submersion - Runoff - Infiltration - Sprinkling – Localized

3 Study and design of flood irrigation,

- Definitions
- Subcession basins
- Calculation of irrigation modules
- Doses and duration of irrigation

4 Study and design of trickle irrigation

- Definitions
- Advantages and disadvantages
- Drip board
- Calculation of runoff rates
- Calculation of irrigation times

5 Study and design of infiltration irrigation

- Definitions
- Channel designs

6 Study and design of sprinkler irrigation

- Definitions
- Advantages and disadvantages
- Spray density and soil permeability
- Projection devices (flow rate, pressures, radius of action, etc.)
- Irrigation doses and frequencies
- Watering duration..

7 Study and design of localized irrigation or micro-irrigation

- Definitions of drip irrigation
- Advantages and disadvantages
- Drip irrigation
- Calculation of water deficit
- Calculation of the uniformity coefficient
- Calculation of doses and duration of irrigation

8 Irrigation management principles and methods

- Definitions
- Control method (tensiometry, etc.)

Tutorials

- Calculation of submersion time
- Calculation of speed and runoff time
- Calculation of the sprinkler irrigation module
- Calculation of drip irrigation duration
- Calculation of crop water consumption
- Calculation of the in situ water balance
- Determination of calibration equations for measuring devices

Practical work:

- Determination of the spray density of a sprinkler
- Determination of the uniformity of sprinkler irrigation
- Determination of the uniformity coefficient on a drip irrigation network
- Measurement of soil humidity by: gravimetry, tensiometers and neutron probe
- Installation and reading of tensiometers in situ
- Calibration and use of neutron probes
- Radio infrared thermometry in the field
- Measurement of leaf potential in situ

Study outing

Visit to working sprinkler and drip irrigation networks

Non-face-to-face personal work

- Mini project of calculation of an irrigation network among the different systems

Assessment method: Continuous and Exam

References:

- Messahel Mekki, 1988 Irrigation goutte à goutte
- Ollier et Poirée 198 Les réseaux d'irrigation , théorie, techniques et économie des arrosages
- Mathieu clément 2007 Bases et techniques de l'irrigation par aspersion
- Urban Laurent 1997 Introduction sous serre- l'irrigation fertilisante en culture hors sol tome2
- Tiercelin, Jean robert 1998 Traité d'irrigation

Master Title:Hydro-agricultural Infrastructures

Semester: 1

Unit title: FTU2

Mattertitle: Applied hydrology

Credits: 6

Coefficients: 3

Teaching objectives: Understanding of surface hydrology at basin level, frequency study of precipitation and flow gauging.

Recommended prior knowledge: Climatology, pedology, general hydraulics, applied mathematics, statistics and probabilities.

Mattercontent:

1- Water cycle

2 Watersheds

- Definitions
- Description of the characteristics of the watershed
- Form characteristics
- Stream network feature
- Physiographic factors
- Other characteristics: (vegetation, geology, evapotranspiration, etc.)

3 A few notions of statistics

- Statistical analyzes and probability laws: order of the series, grouping of values, position and dispersion parameters, and probability laws

4 Precipitation study:

- Formation and classification of precipitation
- Precipitation measurements
- Statistical study of precipitation
- Study of showers
- Frequency analysis of the data
- flow measurement.

5 Evaporation and sweating

- Evaporation
- Sweat
- Measurement of evaporation
- Perspiration measurement

6 Stealth

- Definitions
- Infiltration capacity
- Infiltration measurement

7 Superficial flows

- Hydrometry and gauging methods
- Study of floods

8 Study of solid transport

- Solid transport in suspension

- Solid transport in bedload and saltation

Tutorials

Calculation of the characteristics of a watershed

Calculation of precipitation over the entire catchment area (methods: Thiesses, Isohyets, etc.)

Notions of regressions and correlations..)

Practical work :

Watershed study

Calculation of watershed parameters

Exit

Flow measurement (gauging)

Non-face-to-face personal work

- Mini-project - Study of a hydrographic network of a watershed.

- Method of assessment: Continuous and Exam

References :

- André Musy, 2004 hydrologie

-Ahmed Sari, 2003 Initiation à l'hydrologie de surface

- Réménieras G Hydrologie de l'ingénieur

- Laborde J-P 2009 Eléments d'hydrologie de surfac

- Touaibia Benina, 2007 Manuel d'hydrologie

- WWW.hydrologie.org

Master Title: Hydro-agricultural Infrastructures

Semester: 1

Unit title: MTU

Mattertitle: Soil science and development

Credits: 5

Coefficients: 3

Teaching objectives: Basic knowledge of the soil for agronomic interest

Recommended prior knowledge: geology, physics, chemistry

Mattercontent:

- Soil classifications
- Soil formation
- Soil morphology
- Study of soil texture
- Study of soil structure
- Study of cation exchange phenomena
- Study of the origins of soil salinity
- Studies of soil development methods

Tutorials

- Granulometry
- Soil fertility
- Soil salinity and alkalinity
- Evaluation and suitability of soils for irrigation
- Personal work

Practical work :

- Granulometry
- Organic material
- Limestone
- Electrical conductivity of soils
- Exchangeable cations
- Soil moisture
- Permeability

Non-face-to-face personal work

- Mini-project to assess the suitability of soils in an agricultural area
- Assessmentmethod: Continuous and Exam

References :

- Gobat , jean Michel 2003 : Bases de pédologie, Biologie des sols
- Soltner Dominique 2007 Bases de la production végétale Tome 2 : le climat, météorologie, pédologie, conservation des sols, bioclimatologie, agronomie du carbone
- Margulis H.G.V 1963 Pédologie générale
- Do chauffour philippe – Abrégé de pédologie : sol, végétation, environnement

Master Title: Hydro-agricultural Infrastructures

Semester: 1

Unit title: MTU

Mattertitle: Water quality in Agriculture

Credits: 4

Coefficients: 2

Teaching objectives: Treatment and characterization of the quality of irrigation water for its safe use for the plant and the soil.

Recommended prior knowledge: General chemistry, microbiology, soil science, plant physiology

Matter content:

-Reminder on the role of water in the plant

-Physico-chemical properties of water

- Irrigation water resources,

-Physical quality indicators and standards

- chemical and biochemical quality indicators and standards

- Quality indicators and standards. Microbiological

- irrigation water classifications, crop tolerance

-Impact of water quality on the plant and the soil.

-Principles and methods of wastewater treatment and their reuse of wastewater in irrigation. - Actions of water on hydro-agricultural structures

Applications of water characterization diagrams

Examples of application on the calculation of SAR and residual alkalinity

Practical work:

Measurement Temperature, PH, electrical conductivity and distillation of water

Dosage of the main chemical elements in the water (Sodium, calcium, magnesium, chlorine, nitrates and nitrites, etc.)

Measurement of the chemical oxygen demand of polluted water

Measurement of the biochemical demand of polluted water

Microbiological analyzes

Determination of the alkalimetric title

Non-face-to-face personal work

Mini project: Case study of the assessment of the suitability of water for irrigation, either surface, Underground or residual.

Assessment method: Continuous and Exam

References

- Glover C.R 1996 – Irrigation water classification system (Guide)

-Pearson GA 1960 Tolérance of crops to exchangeable sodium USDA

- Ayers R et Wescot D 1988 La qualité de l'eau en agriculture

- Couture 2006 Principaux critères pour évaluer la qualité de l'eau en micro irrigation

- Codom N Marlet S et Lafolie A.F 2002 Modélisation de la salinisation, sodisation et alcalinisation des sols irrigués –Calibration du model Pastis sur monolite sol.

- www.iav.ac.ma/agro/dss/chimiesol/table_tolerance_Na.htm

- Site de l'institut de l'institut agronomique et vétérinaire Hassan II

Master Title: Hydro-agricultural Infrastructures

Semester: 1

Unit title: DTU

Mattertitle: Water and climate change

Credits: 2

Coefficients: 2

Teaching objectives: General knowledge of climate factors and climate change and its impact on agriculture

Recommended prior knowledge: Agro meteorology and bioclimatology

Mattercontent:

- Definitions of climate,
- Study of climate factors
- Study of climatic parameters
(Temperature - Precipitation - wind speed - Insolation - humidity -...)
- Methods of measuring climatic parameters
(Thermometers, rain gauges and rain gauges, anemometer, hygrometer, evaporimeters, etc.)
- Identification of bioclimatic stages
(Emberger diagram, ombrothermic diagram)
- Definition of dryness
- Climate change and agriculture
- Climate change and water resources,
- climatic changes and irrigation.

Tutorials

- Example of climate classification and bioclimatic stages
- Presentation and debates on the climate and its impacts on agricultural production

Non-face-to-face personal work

Bibliographic research carried out by the student on: drought, flooding and their relationship with agriculture (presentation of cases in the world if possible).

Assessment method: Continuous and Exam

Master Title: Hydro-agricultural Infrastructures

Semester: 1

Unit title: TTU

Mattertitle: Communication

Credits: 1

Coefficients: 1

Teachingobjectives: Mastery of communication methods and techniques and develop the capacity to set up a communication system.

Skills Targeted: Achieve the following abilities:

- Communicate well orally and in writing
- Better receive and exchange information
- Make good use of professional documents for internal and external communication
- Write professional documents for internal and external communication
- Promote self-confidence
- Define and understand the goals to be achieved;

Prior knowledge recommended

Linguistic basics

Matter content

- Introduction to the history and theories of communication
- Definition and general context
- Oral communication techniques
- Techniques of written communication
- Documentation techniques
- Meeting techniques
- Element of linguistics
- Remote communication tools
- Use of the Microsoft Office tool: Word, Excel, Powerpoint.....
- Internet: exchange and search for information
- Effectiveness of communication
- Analysis and production of the message
- Reinforcement of language skills
- Communication methods
- Internal and external communication
- Oral and written communication

Non-presential work

- Preparation of examples of written and oral scientific communication according to different international standards (explains and justifies the steps)

Assessment method: Continuous and Exam

References

Thèses, périodiques, articles, actes de colloques, publications électroniques....)

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: FTU 1

Mattertitle: Hydraulic 2

Credits: 6

Coefficients: 3

Teaching objectives: Mastery of free surface flows

Recommended prerequisites: Students should have basic knowledge of physics, applied mathematics, hydrostatics and general hydraulics

Mattercontent:

1. General information on free surface flows:

- Hydraulics of a channel
- Classification of free surface flows
- speed of a section, flow regimes,
- pressure and average load in a section)

2. Uniform permanent flow

- Definitions and properties
- equation and formulas
- calculation of the uniform flow in the case of a covered channel
- calculation of the uniform flow in the case of an open channel

3. Gradually varied non-uniform flow

- Definition,
- variation of the specific load
- Critical regime
- Swirl Curves

4. Suddenly varied non-uniform flow

- Generality and methods of study,
- Hydraulic jump
- Control section
- the various weirs
- the parshal valves,
- Hydraulic jump applications

5. Study of singularities

- Change of slope
- change in level of the raft
- change of the section, elbows, grids, etc.)

6. Notions on non-permanent flows (Non-permanent flow gradually varied and abruptly varied)

Tutorials :

- calculation of channel parameters,
- calculation of circulars,
- critical depths and loads,
- calculation of water lines with the different methods,
- calculation of the combined heights of a hydraulic jump,
- sizing of energy dissipation basins.
- calculation of weirs with thick sills and thin sills,...)

Practical work :

- Uniform regime in a channel
- swirl curves
- hydraulic jump
- valves
- weirs

Field trip:

See irrigation canals, weirs, energy dissipation ponds

Non-face-to-face personal work

-Mini-project: Case study of a network in an agricultural area

Assessment method: Continuous and Exam

References :

- Walter Graf A 2004 Hydraulique fluviale
- Armendo Lencastre, 2005 : Hydraulique générale,
- Michel Carlier, 1986 : Hydraulique générale et appliquée,
- Saad Bennis ,2009 Hydraulique et hydrologie
- Boualem Remini , 2005 Hydraulique appliquée

Master Title : Hydro-agricultural Infrastructures

Semester: 2

Unit title: FTU 1

Mattertitle: Agricultural drainage and dimensioning

Credits: 6

Coefficients: 3

Teaching objectives: Diagnosis of the problems of salinity and flooding of agricultural soils, choice of appropriate drainage techniques, dimensioning of drainage networks.

Recommended prior knowledge: Students must have knowledge of soil science, bioclimatology, plant physiology, applied mathematics and general hydraulics.

Matter content:

1 Objectives of agricultural drainage,

- Excess salts
- Excess water

2 causes of soil salinity,

- Salty soils
- Irrigation

3 causes of soil flooding,

- Rainfall
- Runoffs
- Permeability
- Underground flows

4 characterizations of soil salinity and alkalinity,

- Soil salinity
- Soil alkalinity

5 Drainage regimes, characteristic flow rates,

- Steady state
- Variable speed

6 Division into sectors and calculation of the flow rates

- Homogeneous sectors
- Throughput per sector

7 accumulation of plot flow rates,

- Method of cumulating flows from upstream to downstream
- Practical example

8 calculation of collectors, spacing of ditches,

9 - Spacing of drains, depth of drain pits,

- Calculation methods using formulas
- Methods of graphical calculation

10 Network installation techniques,

- Drainer equipped with remote control

- Installation of drains and security

11 Network maintenance.

Maintenance methods

Tutorials

- Characterization of soil salinity and irrigation water

- Calculation of the characteristic flow

- Network route

- Calculation of cumulative flows

-Calculation of collectors,

-Distances and depths of ditches

- Spacing and depths of drains

Assessment method: Continuous and Exam

Non-face-to-face personal work

Mini-Sizing project for an agricultural drainage network

References :

- Martinez Beltrans .J 1999 – Land drainage In van Lier H.N.I.S Pereira and F.R Steiner CIGR Handbook of agricultural Engineering vol 1

- Musy A 1972 les bases scientifiques de l'assainissement des sols, les methods d'assainissement et leur efficacité.Rapport de synthese. Commission international du génie Rurale

- Smedema L.K and D.W Rycroft 1983 Land drainage: Planning and design of agricultural drainage system. Batsford. London

- Moody WT 1966 Non linear Differential equation of drain spacing- American society of civil Engg.IR

- FAO 1972 Drairage Material – Irrigation and drainage paper 9

- FAO 1980 Drainage Design Factors – Irrigation and drainage paper 38

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: FTU 2

Matter title: Catchments Mapping

Credits: 6

Coefficients: 3

Teaching objectives: Creation and distribution of maps

Recommended prior knowledge:

- Mastery of basic computer tools, Microsoft Excel, Windows environment
- Applied Mathematics
- Topography

Matter content:

- Basemap,
- Surveys of the contours and the support space to be represented,
- Representation of icons and map styles,
- creation of the map,
- map layout

Practical work :

- Surveys of contours,
- Records of space data,
- Records of statistical data
- Graphic design,
- Map assembly,
- Map layout.

Non-face-to-face personal work

Min-Project: Cartographic study of a watershed

Assessment method: Continuous and Exam

References

- Steinberg Jean 2003 Cartographie : système d'information géographique et télédétection
- Libault André : la cartographie
- Chorowicz jean – La télédétection et cartographie géomorphologique et géologique

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: MTU1

Mattertitle: Applied statistics

Credits: 3

Coefficients: 2

Teaching objectives: Description of the characters studied, treatment and analysis of the variables

Recommended prerequisite knowledge: Applied Mathematics

Matter content:

1-General introduction to statistics

2-Descriptive statistics

- Character definition: qualitative and quantitative
- Graphic representation of characters
- Calculation and interpretation of position parameters
- Calculation and interpretation of dispersion parameters

3Statistical correlations and adjustments

- Calculation of the correlation coefficient
- Definitions of statistical adjustments
- Linear adjustment by the graphical method
- Linear adjustment by the mathematical method (least squares)

4 Analysis of variance

5 Law of probabilities

- Normal Gauss Law
- Binomial distribution and Poisson

6-Statistical tests

Definitions of the different statistical tests and their purposes

- Test of hypothesis, conformity, KHI-DEUX..

Tutorials

- Location settings
- Dispersion settings
- Variance analysis: Application on computer software
- Statistical regressions: Application on computer software
- Statistical testing

Non-face-to-face personal work

- Application of Statistical Test manually then with software on series of statistical data

Assessment method: Continuous and Exam

References

- Dervin c 1992 : Comment interpreter des résultats d'une analyses factorielle des correspondances
- Debouzie D Thioulouze J 1986 – Statistics fin spatial and temporal structures in populations .Pest control opérations and systèmes analysis in fruit fly
- Dagnelie P 1994 – Théorie et méthode statistiques- les presses de Gembloux
- Cehessat R 1986 Exercices commentés de statistiques et informatiques

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: MTU1

Mattertitle: Geographic information systems

Credits: 3

Coefficients: 2

Teaching objectives

- Mastery of the basic notions of computer management of spatial databases
- Analysis of spatial relations (integration, spatial query, combination and superimposition of categories)
- Application for the computing management of water networks

Recommended prior knowledge

- Mastery of basic computer tools, Microsoft Excel, computer environment
- Notions of thematic cartography
- Notion of geo localization and projection systems

Matter content:

GIS are now widely used, both by administrations and technical services. Also, the program contains both the basic notions of computer management of spatial databases (digitization by vectorization and in raster mode, etc.), as well as geomatics analysis and cartography by simple query execution or the study of scenarios. devolution. A course support will also be made available to students for the creation of a GIS applied to their field of interest (specialty).

Practical work :

- Computer management of spatial data
- Analysis of spatial relationships
- Application for water management

Non-face-to-face personal work

- Min-Project: Case study of your choice depending on the availability of the database

Assessment method: Continuous and Exam

References

- Steinberg Jean 2003 Cartographie : système d'information géographique et télédétection
- Libault André : la cartographie
- Chorowicz jean – La télédétection et cartographie géomorphologique et géologique
- (*Livres et photocopiés, sites internet, etc*).
- *La cartographie thématique*
- *Géodésie et topographie* http://fr.wikipedia.org/wiki/Syst%C3%A8me_d'information_g%C3%A9ographique

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: MTU2

Mattertitle: Agriculture and sustainable developpement

Credits: 3

Coefficients: 1

Teaching objectives: Learn the principles of sustainable management of natural resources and their preservation

Recommended prior knowledge: Students must have knowledge of intensive agriculture and its impacts on natural resources

Matter content:

- Agricultural policies
- Global and regional food crisis
- Demography and agricultural production
- Agricultural geography in Algeria (reliefs, areas and suitability)
- agricultural production systems: extensive and intensive, chemical fertilizers
- salt water and irrigation
- Soil management and preservation
- Management and rational use of water resources
- Qualitative management of agricultural production
- Concept of organic farming.

Non-face-to-face personal work

- Bibliographic research on the relationship between traditional and modern agriculture and sustainable development (advantages and disadvantages..)

Assessment method: Continuous and Exam

References :

- Chaouia CH, Mimouni N Trabelsi S, Benrebiha FZ Bouterkrat et Bouchenak F Evaluationsdes besoins en matière de renforcement des capacités nécessaires à la concervation et l'utilisation durable de la biodiversité importante pour l'agriculture en Algérie : Les especes fruitières, viticoles et phoenicoles : Recueil des communications << Biodiversité importante pour l'agriculture>>.
- FAO 2008 –Production agricole, culture primaire, banque de données statistiques.
- Site : [http// www.fao-org.com](http://www.fao-org.com)
- Drst , J 1984 Ecologie générale , description du milieu et analyses des composantes principales
- Colignon p et al 2000 Efeet de l'environnement sur la biodfiversité entomologique en cultures maraichères de plein champ.
- Dajoz , R 1985 précis d'écologie 5ème édition

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: DTU

Matter title: English

Credits: 1

Coefficients: 1

Teaching objectives: Learn basic grammar and vocabulary and terminology relating to the agricultural hydraulics specialty

Recommended prior knowledge: Fundamentals of English

Matter content:

Study of scientific texts from books or publications relating to the specialty of agricultural hydraulics.

Practical work

-Technical text study and basic terminology

Non-face-to-face personal work

Writing of text in English describing a scientific theme in the field of water in Agriculture

Assessment method: Continuous and Exam

References

- Jacque Bert 2000 Dictionnaire scientifique : Anglais français

- Bulger Anthony 2002 L'anglais la methode

- Michel Jean pierre 2004 Dictionnaire des sciences de la terre

Master Title: Hydro-agricultural Infrastructures

Semester: 2

Unit title: TTU

Mattertitle: Legislation

Credits: 1

Coefficients: 1

Teaching objectives : Introduce the learner to regulatory concepts, definitions and origins of legal texts and knowledge of criminal consequences.

Prior knowledge recommended

General notions on the laws of the republic, the texts of the official journal relating to agriculture.

Targeted skills :

- o Ability to read and understand a legal text
- o Ability to apply regulations

Mattercontent:

- General notions of law (introduction to law, criminal law).
- Presentation of Algerian legislation (www.joradp.dz, text references).
- General regulations (consumer protection law, hygiene, labeling and information, food additives, packaging, brand, safety, conservation).
- Specific regulations (personal work, presentations).
- Control bodies (DCP, CACQUE, office of hygiene, ONML).
- Standardization and accreditation (IANOR, ALGERAC).
- International standards (ISO, codex alimentarius, NA, AFNOR)
- Decrees and regulatory texts on the reuse of treated wastewater in irrigation
- The texts of the administrative management of the national office of irrigation Drainage.

Non-face-to-face personal work

Synthesis, analysis and criticism of legal and administrative texts of the water and agriculture sector in Algeria or other region of the world

Assessment method:Continuous and Exam

Références Bibliographiques

Journal Officiel, lois internationales, textes juridiques et administratifs relevant de la tutelle

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: FTU1

Mattertitle: Pump station

Credits: 6

Coefficients: 3

Teaching objectives: Description and operation of pumping stations.

Recommended prior knowledge: General hydraulics, hydraulic machines, mathematical electricity

Matter content:

1- Pumping station

- "Physical" components
- General structure

2 - Electrical equipment (

- Energy requirements
- Power Budget
- rescue concept
- components of electrical equipment
- organization
- rules and standards-installation

3 - Hydraulic equipment

- Installation: problems - precautions - rules - use of standards, accessories

4- The station as a civil engineering structure

- (Problems, Examples)
- the automation of the operation of a pumping station,
- (Requirements and problems - General structure, Principles - Functions to be performed - Organization, Network management parameters, Information capture - Sensors, Information transmission, Command center).

Tutorials

A:- Hydraulic equipment

- rules - use of standards
- accessories
- Network management parameters

B: OUTPUTS

visit of a pumping station for irrigation (infrastructure, equipment in place, surfaces affected by irrigation)

Non-face-to-face personal work

Mini Project: Realization of a partial pre-project of a pumping station with a ramified irrigation water distribution network

Assessment method :Continuous monitoring and Exam

References :

- Cemagref 1996 Les stations de pompage individuelles pour l'irrigation
- Errahmani Malika 2009, Errahmani Bouziane 2009 Etude d'une station de pompage d'eau par énergie solaire

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: FTU1

Mattertitle: Irrigation scheduling and automatisisation

Credits: 6

Coefficients: 3

Teaching objectives: Water-soil-plant relationships, determination of crop water needs, determination of doses and frequency, control of irrigation and its automation.

Recommended prior knowledge: Students must have knowledge of soil science, bioclimatology, plant physiology, applied mathematics and general hydraulics.

Matter content:

- 1- Water-soil-plant and atmosphere relationships
- 2- Crop water requirements
- 3-Theories for calculating doses and irrigation frequencies
- 4 Rational management of irrigation
- 5 principles of irrigation systems.
- 6 Irrigation management methods,
- 7 Operation of automatic irrigation systems
- 8 Overview of irrigation efficiency and strategy.

Tutorials

Useful and easily usable reserve calculation

Water balance

Dose and frequency of irrigation

Practical work

- Measurement of soil moisture by gravimetry
- Measurement of soil moisture by different neutron methods
- Installation of tensiometers and follow-up of piloting
- Determination of the soil water retention curve
- Measurement of soil bulk density
- In situ hydraulic conductivity measurement

Non-face-to-face personal work

- Bibliographic research on the tools of piloting and automation of the irrigation, to bring examples existing in Algeria or in the world

Assessment method: Continuous and Exam

References :

- Ollier ch 1986 : Les réseaux d'irrigation, théorie, techniques et économie des arrosages
- Tiercelin , Jean robet 1998 Traité d'irrigation
- Israelsen O 1998 Traité pratique de l'irrigation
- Messahel Mekki 1988 Irrigation au goutte à goutte
- Hassainya Jemail 1991 : Options méditerranéennes : Irrigation et développement Agricole

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: FTU2

Mattertitle: Anti-erosion installations

Credits: 6

Coefficients: 3

Teaching objectives: Understanding erosion phenomena in relation to Agriculture and knowing how to propose anti-erosion schemes.

Recommended prior knowledge: Basics of soil science and surface hydrology

Matter content:

- Study of the anti-erosion phenomenon
- Erosion and its consequences on the agricultural environment and their development
- Study of anti-erosion schemes
- Proposal for anti-erosion development and means of control

Tutorials

- Calculation of erosion rate
- Calculation of dam siltation

Practical work

- Measurement of solid transport in suspension and charriage
- In situ observation trip

Non-face-to-face personal work

Min-Project: Mini-Project – Proposal of an anti-erosion development plan

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: MTU

Mattertitle: pollution and environment

Credits: 5

Coefficients: 3

Teaching objectives: Fundamental notions on the sources of pollution of irrigated perimeters, prevention of pollution and protection of irrigated perimeters.

Recommended prior knowledge: Agro meteorology and bioclimatology, general and organic chemistry

Mattercontent:

- Irrigated perimeters in Algeria
- definition of pollution
- Sources of pollution of irrigated perimeters
- Impact of pollution on agricultural production
- Fundamentals of conventional and unconventional waters
- Treatment of polluted water
- Water quality standards
- Re-use of treated water in irrigation
- Impact of pollution on humans, agricultural soils and the environment
- Perimeter protection measures: (rational use of fertilizers, qualitative management of irrigation, etc.).

Tutorials

- Application of data processing methods on software
- Water quality standards

Practical work

Water pollution indicator

Soil pollution indicator

Air pollution indicator

Non-face-to-face personal work

Min-Project: Case study of pollution in an irrigated perimeter: sources of the problem, consequences and solution

Assessment method: Continuous and Exam

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: MTU

Mattertitle: Maintenance and rehabilitation of systems

Credits: 4

Coefficients: 2

Teaching objectives: Diagnosis of irrigation networks and analysis of gaps, measures to be taken for the rehabilitation of irrigation networks

Recommended prior knowledge: Students must have knowledge of the sizing and installation of irrigation systems, the operation of irrigation networks.

Mattercontent:

- Description of irrigation networks
- Overview of network installation
- Network operation
- Types and quality of equipment
- Network management
- Notions of efficiency of irrigation systems
- Diagnosis of technical network problems
- Network rehabilitation
- Organization of maintenance
- Investment and economic profitability of irrigation (choice of projects, size of projects, choice of crops, etc.).

Non-face-to-face personal work

Bibliographic research carried out on the techniques for installing irrigation networks in relation to the evolution of equipment and their maintenance

Assessment method: Continuous and Exam

References :

- Durant J.H 1982 les sols irrigables
- Mathieu clément 2007 Bases et techniques de l'irrigation par aspersion
- Ollier ch 1986 : Les réseaux d'irrigation, théorie, techniques et économie des arrosages
- Traité d'irrigation

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: DTU

Mattertitle: Technical English

Credits: 2

Coefficients: 2

Teaching objectives: Deepening of the language and introduction to translation

Recommended prior knowledge: Basics of the English language in vocabulary and grammar

Matter content:

- Study of grammar and in-depth vocabulary

- Principles of translation

Tutorials

-Analysis and interpretation of scientific texts related to the specialty

Non-face-to-face personal work

Translation of existing scientific texts (research articles, communication.seminar) from French to English and vice versa

Assessment method: Continuous and Exam

Master Title: Hydro-agricultural Infrastructures

Semester: 3

Unit title: TTU

Mattertitle: Entrepreneurship

Credits: 1

Coefficients: 1

Teaching objectives: Understanding the legal and administrative procedures for creating a business, setting up a project and managing it.

Targeted skills :

- o Understanding of the organization and functioning of a company
- o business creation
- o launch and management of a project

Recommended prerequisite knowledge: General knowledge of administrative laws and the economic environment

Mattercontent:

1. The business and business management

- o Business definition
- o Business organization
- o Supply management:
 - Procurement management,
 - Inventory management
 - Store organization
- o Production management:
 - Production mode,
 - Production policy
- o Commercial Management and Marketing:
 - Product policy,
 - Price policy,
 - Advertisement,
 - Technical and sales team

2. Setting up a business creation project

- o Definition of a project
- o Project specifications
- o Project financing methods
- o The different phases of project implementation
- o Project management
- o Deadline management
- o Quality management
- o Cost management
- o Task management

Non-face-to-face personal work

- Case study of existing or planned project assembly.
- Analysis and criticism of an example of a functional project

Assessment method: Continuous and Exam

References :

- Lazary 2001 Economie de l'entreprise
- Poussencult chantal 2006 – Economie et gestion de l'entreprise
- Pierre Bezakh 2008 Dictionnaire de l'économie

