

**REPUBLIC ALGERIAN DEMOCRATIC AND POPULAR
MINISTRY OF HIGHER EDUCATION AND OF
THE RESEARCH SCIENTIST**

MASTER ACADEMIC

Field	Branch	Speciality
Nature, Life & Earth Sciences	Ecology and Environment	Bioclimatology

Field: Natural and life sciences

Branch: Ecology and Environment

Speciality : Bioclimatology

2015/2016

Context And objectives of there training

A – Terms of access.

This specialty opens up to several specialized licenses in climatology sciences, ecology, science organic, science of the floors, science in waters geosciences Andenvironment.

B - Goals of there training .

This Master's specialty in Water and Bioclimatology has already been operational since the year university 2011/2012, We sum NOW To there fourth promotion At level of the faculty of natural and life and earth sciences of the university Djilali Bounama by Khemis Miliana. Its objective is to train students by and for the research to knowledge, methods And tools, And concepts required To there progression of knowledge and its applications in the field of the valorization of water resources within the overall functioning of ecosystems in close relationship with their biodiversity in a climatological context defined.

THE science ecological, hydrological, science of the water And of there bioclimatology combined to tools analysis statistical, of the GIS, of there geostatistics And of there remote sensing are the core of the training in “water and bioclimatology” offered. These different acquired multidisciplinary allow to graduates of this training of take part in genuine consultation within the framework of sustainable development based on the approach to the preservation of the nature of our territories and our landscapes Seine and free from pollution based on integrative approaches to objects (territories, landscapes...) And of issues complex (changes climatic, nuisance environmental...).

C – Profiles And SKILLS trades targeted .

THE recruitments targeted are basically THE trades of development In THE administrative, technical and research institutions in the field of the environment and of the water resource. Demographic changes in the labor market in general, and In THE organisms of research And of the environment in particular, imposed of renew THE generations of researchers, technicians, scientific experts.

At the same time, the challenges faced by research at the national level, in particular because it is an essential element in achieving the sustainability of our environment to be livable and viable. They increasingly require not only the production of analytical knowledge, but also skills on the integration of these knowledge during the study of complex systems.

The outgoing student must be able to carry out sampling, readings and analyze samples or sequences of climatic data in order to assess both the quantity and water quality. He will be able to define and determine the origins of physico-chemicals And organic of the environments And to study their impacts on the environment. Finally, he will be able to implement techniques for the prevention and treatment of degradation of the ecosystems And of their pollution Related with the climate.

D- Potentialities regional And national employability of the graduates

At the end of their training, graduates will be able to intervene on any problem environmental related to water, soil, natural plants and this by predicting the impact, by diagnosing the situation or intervening in remediation. Their actions relate to various aspects, in particular those related to the physico-chemistry and biology of environments : there relationship between THE climate, And there biodiversity, And there pollution of the waters And eutrophication Thus that To there contribution To there decision In there management integrated of the water resources.

The graduate of this specialty, he will be able to implement the techniques of prevention and blueprints of shares according there policy general of the state.

THE sectors socio-economic Who are directly interested by this speciality are as No comprehensive :

- Sector of the environment
- Sector of the drills And Agricultural services
- Sector of the water (ABH, ANRH, ANBT, ACT, WE HAVE, ONDD...)
- Sector industrial classified companies
- Wastewater treatment plant of the waters worn
- Stations of treatments of the waters
- Division hydraulics of there willaya
- Offices national of there meteorology
- Sector of Trainings And of improvements.
- Offices studies multidisciplinary national and international
- Universities

Beyond the existing framework and the teaching resources offered by our Faculty Thus that the experience acquired by the educational team (teachers, technicians of laboratory) In there training of the Masters In this speciality, We wish that this specialty continues to form our students In this specialty.

E – Gateways towards others specialities

The Master in Bioclimatology aims to train well-initiated skills in the research and therefore precedes the Doctorate. Several bridges between this master and the others Master exist; we mainly cite the specialties specialized in the ecology of environments natural due to their coincidence perfect with THE mods of this specialty.

F – Indicators of followed by there training

The objective of the device is the diversification of control methods in order to assess the most widely possible THE SKILLS of the students. In this frame, we will assess:

- (1) empowerment of the student ;
- (2) THE follow up regular of acquisition of the knowledge ;
- (3) acquisition of oral expression ;
- (4) acquisition of the abilities working in crew And of work of synthesis ;
- (5) Control of the capacities of the student and no of his knowledge.

The distribution between the different forms of knowledge control is as follows: Control knowledge : 30 %

Oral expression: 10% Work staff:

40%

Ability of analysis and of synthesis: 20%

II – Form organization half-yearly of the lessons
(The sheets of the 4 semesters)

First Semester 1

Teaching unit	Matter	Credit	Coefficient	C	TD	TP	Volume (hour)
Fundamental Unit	Environmental climatology	6	3	1h30	3h00		67h30
	Surface hydrology	6	2	1h30	1h30	1h30	67h30
	Hydrobiology	6	3	1h30		3h00	67h30
	Applied Ecotoxicology	4	2	1h30		1h30	45h00
	Geochemistry water and Pollution water	4	2	1h30		1h30	45h00
Methodological unit	Statistical analysis of data	2	2	1h30		1h30	45h00
Transversale Unit	Communication methods	1	1	1h30			22h30
	Scientific English 1	1	1	1h30			22h30

Second Semester 2

Teaching unit	Matter	Credit	Coefficient	Courses	TD	Practical Work	Volume (hour)
Fundamental Unit	Overall operation of ecosystems	6	3	3h00	1h30		67h30
	General hydrology	6	3	1h30	1h30	1h30	67h30
	Vegetation cover meteorological factors and environmental	6	3	3h00	1h30		67h30
Fundamental Unit	Water erosion and climate	4	2	1h30	1h30		45h00
Methodological unit	Data processing Spatial	2	2	1h30		1h30	45h00
Discovery unit	Instrumental analysis	2	2	1h30		1h30	45h00
	Agronomic Modeling	2	2	1h30		1h00	45h00
Transversale Unit	Scientific English II	1	1	1h30			22h30
Transversale Uni	environment cod	1	1	1h30			22h30

Third Semester 3

Teaching unit	Matter	Credit	Coefficient	C	TD	TP	Volume (hour)
Fundamental Unit	Soil - Plant - Atmosphere	6	3	3h00	1h30		67h30
	Hydrobiogeochemical cycle	6	3	1h30	1h30	1h30	67h30
	Statistical hydrology	6	3	1h30	3h00		67h30
	Sampling and experimentation	4	2	1h30	1h30		45h00
Methodological unit	Applied Geostatistics	2	2	1h30		1h30	45h00
Discovery unit	Environmental policy and sustainable development	2	2	1h30	1h30		45h00
Transversale Unit	Entrepreneurship	1	1	1h30			22h30
Transversale Unit	Supervised mini-project	3	3		1h30		67h30

Semester 4

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

	VHS	Coeff	Crédits
Personal Work	450	9	18
	420	5	9
Internship in a company			
Seminars	75	2	2
Other (contacts)	35	1	1
Total Semester 4	980	17	30

III - Program detailed by matter
(1 form detailed by matter)

Title of the Master: Bioclimatology

Semester : 1

Course title: UEF1 (Climate and environment) Subject title: Environmental climatology Credits : 6

Coefficients :3

Goals of teaching :

The course enables students to understand the natural environment under the influence of the climate; Thus exploitation methods bases of climatology necessary for the functioning of ecosystems informed about the changes climatic And their impact on the environment.

Content of there matter :

Chap.01 : Introduction To there climatology of the environment.

concepts fundamentals of there Climatology

THE factors And the elements of climate.

Vigils climatic And networks comments meteorological.

Controls of there quality of the data And homogenization.

Chap.02 : Classification of climates

concepts generals.

Classification of Koppen

clues of aridities.

Chap.03 : Variabilities And changes climatic.

Definitions

clues climatic To big ladder

Causes And process.

clues statistics (RClimdex)

Chap.05 : impacts of climates on the environment

On the Company

On the environment

3.3. On THE savings.

Chap.05 : System alert.

4.1. systems alarm And surveillance

4.3 blueprints And recommendations of struggles

Chap.04 : Agro-climatology

factors To control

Interactions soil-plants And atmosphere.

4.2. Influence of covered vegetable

Work staff.

Mini-project to form of study climatological of one region appropriate of one bowl hydrographic.

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology

Semester : 1

Subject title : Surface hydrology Entitled of the EU:

UEF1

Subject title: General hydrology Credits : 6

Coefficients :3

Teaching objectives : The course presents the fundamental notions of hydrology, which allow to students of GOOD beings able In A bowl pouring of define And delimitcorrectly and understand the different workings of hydrological processes and know how analyze The behaviour hydrological overall.

Knowledge prerequisites recommended :

The knowledge required to be able to follow this course in Notions of meteorology and instruments, of Cartography And GIS, Ecology general, And Geology.

Content of the subject .

INTRODUCTION TO HYDROLOGY

1: DEFINITIONS

2 : SCIENCE USED

3 : AREAS OF APPLICATIONS

4 : THE METHODS APPLIED IN HYDROLOGY OF SURFACE

Chap.01 : Cycle of the water And balance sheet hydrological

Definition of hydrology

Cycle hydrological

Balance sheet hydrological

Setting of balance sheet hydrological.

Chap. 2 : Precipitation.

Measure of there rain

a) THE rain gauge.

b) THE rain gauge.

THE results rainfall.

Study statistical of the rains punctual

a) Distribution of the rains daily

b) Distribution of the rains annual

c) Method of the stations-years

Rain mean on A bowl

a) Homogenization of the data rainfall annual

b) Method of Thiessen

c) Method of the isohyets

d) THE issue of dejection

Chap. 3: EVAPORATION, EVAPOTRANSPIRATION AND THEIR FACTORS CONDITIONALS.

Measure of the temperatures

a) Temperature of the air

b) Counting of the measures

c) Temperature of the water

Measure of humidity of the air

a) Reminder of some Notions

b) There formula psychrometric

c) THE different guys of psychrometers
 d) influence of there pressure atmospheric
 e) Counting of the observations
 Measure of radiation solar
 a) Battery thermo-electric (Or thermopiles).
 b) Pyrheliometers
 c) Pyranometers To thermopiles
 d) Pyranometer To bimetallic strips
 e) Pyranometers totalizers To distillation
 f) Heliographs
 Measure of wind
 Measure of evaporation
 a) THE atmometers
 b) THE bins evaporator
 c) Tablecloths of water natural
 Formulas relative To evaporation And To evapotranspiration
 a) Law of Dalton
 b) Balance sheet energy
 c) Formula of Penman
 d) Evapotranspiration
Chap. 4 : Flow and infiltration
 there measure hydrological
 Diet hydrological.

Works personal :

- Delimitations of a watershed and determinations the maximum of the parameters is formed mini-projects.
- Output report on the same catchment area and location of measurement stations hydrometeorological.

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology
Semester : 1
Course title: UEF1 (Climate and environment)
Entitled of there matter : Hydrobiology
Credits : 6
Coefficients : 3

Goals of teaching (*Describe This that the student East supposed to have acquired as skills after THE success at this matter - maximum 3 lines*).

Aquatic ecosystems are characterized by special physicochemical parameters on which plant and animal species depend. Assessing the state of health of these environments to do in using THE indicators pollution And the species bioindicators.

Recommended prior knowledge (*succinct description of the knowledge required to power follow this education – Maximum 2 lines*).

Zoning of water bodies using physicochemical parameters, use of germs indicators of fecal contamination For evaluation of the quality of the waters.

Content of there material .

chap1. Reminder on ecology : some definitions.

Chap2. Classification And characterization of the lakes.

Chap3. . Pollution of the environments aquatic.

Study of the settings physicochemical of the water

a. Settings physical : temperature, transparency And there color of the water

b. Chemical parameters: pH, dissolved oxygen, carbon dioxide, nitrogen compounds, phosphorus, silicon, hardness of the water, etc...

Eutrophication of the environments aquatic

Bio-monitoring of the ecosystems aquatic

Bioindicators

a. Hint biological overall normalized (IBGN)

b. Hint biological Macrophytic (IBM)

c. Hint biological of the diatoms (IBD)

d. Hint Oligochaetes of Bioindication of the sediments (IOBS)

Chap 4. Contamination microbial.

Work staff.

Demonstration of the characteristics of the marine ecosystem, studies of the parameters physicochemical, application of zones, identification of characteristic species at eachstage.

Assessment mode: *Continuous assessment (report on practicals, tutorials), examination, etc. (The weighting is left at the discretion of the team training)*

Title of the Master: Bioclimatology
Semester : 1
Title of the UE: UEF 2 (Toxicity of the environment) Subject title: Applied Ecotoxicology
Credits : 4
Coefficients : 2

Goals of teaching :

There relationship between the water And the environment East bet in evidence by THE aspects having For result in environmental degradation. The origin and nature of the various types of pollution must betaken into consideration For power to act For a quality best of the water.

Knowledge prerequisites recommended :

THE knowledge required For power follow this education chemistry

Content of there material .

Introduction general on the ecotoxicologist

Chap. 01 : THE toxic

- 1- definition And the origin
- 2- THE deferent micropollutants
 - a- THE metals And micropollutants minerals
 - b- THE micropollutants organic
 - c- THE radioelements.
- 3- media contamination mode To-
 - a- water superficial
 - b- water underground.

Chap.02 : The ecotoxicologist

- 1- definition
- 2- danger concept 3-
notion exhibition
 - a- there bioavailability
 - b- there degradation And there biodegradation
 - c- bioaccumulation4-
concept of risk

Chapter 03: notion of pollution

- 1- definition
- 2- THE effects of the pollutants on THE organisms
 - a- effects on the organism and pollutionb-
effects At level cellular And molecular
 - c- effects on the system hormonal

Chapter 05 : there plug in account of the toxic by regulations :

- 1- reminder of the main sectoral regulations concerning toxic pollution To- industrial
discharges
 - b- THE waste
 - c- THE Site (s And floors polluted Or potentially polluted
 - d- THE releases radioactive.

Work staff :

Sampling of the natural environment to determine the concentration of elements mineralsby (UV spectrophotometry). And identification of the dead or toxic elements by chromatography layer thin

Fashion devaluation : *Control continued, review, etc*

Title of the Master: Bioclimatology

Semester : 1

Entitled of the EU : UEF2 (Toxicity of environment)

Subject title: Water geochemistry and pollution.Credits : 4

Coefficients :2

Goals of teaching

The objective of the course is to provide the essentials of the physico-chemical concepts and the laws mathematics on which the geochemical modeling of water is based while associating concrete and typical examples of application to environmental problems and pollution of waters.

Knowledge prerequisites recommended :

THE knowledge required For power follow this education , there chemistry of the minerals, there geology And hydrogeology.

Content of there subject *(must indicate the detailed content of the face-to-face program And of personal work)*

Chap.01 : Context And areas of application of there geochemistry

Chap.02 : concepts physico-chemical

Chap.03 : Geochemistry of the salts And metals heavy

Chap04 : Modelization geochemical

Chap05 : Apps to problems environment.

Work staff.

Identification of a toxic substance in the water of the polluted natural environment, its impact on the environment And his effects on THE organisms living

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology

Semester : 1

Entitled of the EU : Methodology (EMU 1)

Subject title: Statistical analysis of data.Credits : 2

Coefficients : 2

Goals of teaching :

Acquire THE basics statistics For describe, analyze And interpret THE phenomena natural And interaction multiparameter between THE features of environment biotic And abiotic.

Knowledge prerequisites recommended :

Awareness in statistics elementary ; Probability And Math

Content of there matter :

Chap.1. Reminders of descriptive statistics.

Chap 2. Regressions simple And multiple.

Chap 3. Analysis in components main.

Chap 4. Factorial analysis of simple and multiple correspondences. Chap 5. Analysis factorial discriminating.
Chap 6. Ascending hierarchical classifications and dynamic clusters.
Chap 7. Different testing statistics.
Chap 8. Series temporal.

Work staff.

do of the solutions of the problems And exercises statistics

Fashion devaluation : Control continued, review, etc...(The weighting East left To appreciation of the team of training)

Title of the Master: Bioclimatology

Semester : 1

Entitled of the EU : transverse (UET 1)

Title of the subject: Methods of communication.

Credits : 1

Coefficients : 1

Goals of teaching :

Analyze the objectives of internal and external communication and present the methodologies necessary for conduct THE main actions Communication

Knowledge prerequisites recommended :

All training content. SKILLS aimed :

- Ability of GOOD communicate orally And by writing.
- Ability of GOOD to present And of GOOD speak out in audience.
- Ability listening And exchange.
- Ability to use THE documents professionals of communication internal And external.
- Ability of write of the documents professionals of communication internal And external.

Content of there matter :

- Reinforcement of the SKILLS linguistics.
- THE methods of there Communication.
- Communication internal And external.
- Techniques of meeting.
- Communication oral And written.

Fashion devaluation : Control continued, review, etc...(The weighting East left To appreciation of the team of training)

Work staff :

Presentations oral, animation workshop in presence of the teachers, simulation of assembly of meeting, achievement of survey with citizens in the frame of the different mods.

Title of the Master: Bioclimatology
Semester : 1
Entitled of the EU : transient (UET 2)
Subject title: Scientific English I.Credits : 1
Coefficients : 1

Goals of teaching :

This module will allow students to acquire the necessary knowledge in English scientist
And of develop all of their SKILLS linguistics

Knowledge prerequisites recommended :

mastery of english

Content of there matter :

- A coaching systematic To there comprehension written as oral will be carried out notably in multimedia room.
- THE work will carry also on THE specificities grammatical And syntactic of there communication scientist, And This To writing as orally.
- THE fields lexical addressed will be those of the different disciplines scientists And of their applications To biology.

Fashion devaluation : Control continued, review, etc...(The weighting East left To appreciation of the team of training)

Work staff :

Presentations/oral report in the presence of the module teacher, reports, dissertations (exercise of organized argumentation), consultation and reading of bibliography (books, works, items, site website...), drafting of reports.

Title of the Master: Bioclimatology
Semester : 2
Entitled of the EU : UEF1 (Acknowledgement of environment)
Subject title: Global functioning of ecosystemsCredits : 6
Coefficients :3

Goals of teaching .

Complete and improve the basic knowledge acquired in the first semester in terms of ecology And environment All in demonstrating THE role determining cheek by THE interfaces, corridor passing And surfaces of exchange in A ecosystem

Knowledge prerequisites recommended :

THE knowledge required For power follow this education, ecology general, bioclimatology And biology.

Content of there matter :

Chap.1 : Energy in the ecosystem
Chap.2: water in the ecosystem
Chap.3: Biomass and production

Chap.4 :Biotic interactions
Chap.5 : Dynamic of the populations -

Work staff.

Identification of the species vegetable in function of their floors bioclimatic.

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology

Semester : 2

Title of the teaching unit: UEF1 (Recognition of the environment)Entitled of there matter :

Hydrology General Credits : 6

Coefficients :3

Goals of teaching .

Application perfect of the data climatic on THE ground And their interpretations in function of environment

Knowledge prerequisites recommended.

Hydrology of surfaces, instrumentation And measures meteorological And THE Notions of all THEbalance sheet hydrological.

Content of the subject

.Introduction.

1. Reminders of hydrological processes (Origins and paths of river water,types of flows, infiltration capacity, power evaporating..
2. Goals And Application.

Chap.1. THE bowl pouring and his complex

Appearance quantitative of the study physical And morphometric
There measure of the settings geometric And of relief

There measure of the settings morphometric

2.4 The network hydrographic

Classification And trace of the troughs

Calculation of there density of drainage

Calculation of report of confluence .

Calculation of report of length .

Chap. 2 : STUDIES OF THE INTENSITIES OF THE RAINS.

Notions of the rain

: Composition of the hyetograms, hyetograms classified

Relationship Intensity-Duration-Frequency

Analysis of one hyetogram of point of seen of flow.

Chap. 4 : Function of transfer.

Definitions And features of the floods.

Hydrograph unitary

Origin And training floods

1.4. Determination of the floods.

Chap. 6 : Principles of modelization.

Definitions And typology of the models

Description of some models
Reliability of the models
Condition of application.

Work staff :

Mini-projects: determination of P_{jmax} , rainfall intensities, determination of hytograms to leave THE data of the rain gauge. Characterizations of the rain And buildings of the hydrographs.

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology

Semester : 2

Unit title: UEF 2 (Degradation of the environment)

Entitled of there matter : Erosion And climate

Credits : 4

Coefficients : 2

Goals of teaching :

The course deals with the issue of erosion, solid transport and siltation of dams in the bowl pouring. In Algeria, This scourge East spectacular And door of severe damages to hydraulic, agricultural, road infrastructure and it is linked to many parameters that are difficult measurable And controllable that it is matter of studying.

Knowledge prerequisites recommended :

Hydrology general, pedology, statistics And geology.

Content of there matter :

Introduction

Extent And rate erosion on the grounds

Chap. 1 : Erosion And his causes.

1. Definitions.
2. Shapes And process of erosion water.
3. Factors controlling erosion water.
4. Quantification of erosion water.

Link between transportation dissolved And solid.

Link between siltation And there quality of the waters.

Flow of matter And loss of fertility of floors.

4.5. siltation of the dams.

Chap. 2 : Consequences climatic on intensity of erosion

Role of the factors climatic

-THE precipitation

-THE floods

-There drought

-Radiation solar, temperature And evaporation

-THE wind

Causes of erosion wind turbine

Consequences climatic of the storms of dust

Work staff.

- Visit on A dam to calculate THE rate of there vase.
- Determination THE losses in floors To ugly A simulator at laboratory

Assessment method: Continuous assessment, examination, etc...(The weighting is left to discretion of the team of training)

Presentations/report in sleep of the sessions of TD, accounts rendered TD, dissertations (exercise of organized argumentation), consultation and reading of bibliography (books, works, articles, website...), reports of exits, report of internship.

Title of the Master: Bioclimatology

Semester : 2

Entitled of the EU : UEF 2 (Degradation of environment)

Subject title: Vegetation cover, meteorological and environmental factors.Credits : 6

Coefficients : 3

Goals of teaching :

The objective of this module is to describe the main factors of microclimatic variations, to understand their internal mechanisms And their roles dominant on THE environments ecological.

Knowledge prerequisites recommended :

Climatology general, Statistics, Ecology general, Agronomy

Content of there matter :

1. THE components of the environment human.
The environment natural.
The environment built.
The environment social.
2. Ecology.
THE factors ecological abiotics.
THE factors ecological biotics.
3. THE Mechanisms climatic.
THE role of sun.
THE cycle of the water
Evapotranspiration.
There traffic atmospheric
THE changes of the environment climatic.
Of the adaptations Or of the changes volunteers punctual.
Of real changes At level of floor.
Of the changes atmospheric.
Balance sheet radiative And balance sheet of energy.
Relationship climate organisms living.
THE relationships climates & vegetations.
THE biomes.
THE factors main of distribution.
Distribution of there vegetation on the earth.
Roles ecological there vegetation.
Production of oxygen.
Well of carbon.
Reduction of there pollution.
Control of erosion.
Control of wind.
Control of there temperature And of the precipitation.
The effect of there vegetation on there health psychological.

4. THE factors influence the local climate.

THE radiation solar.

THE radiation earthy.

There traffic oceanic.

There composition of the atmosphere.

Elevation.

There geomorphology.

The exhibition.

There vegetation.

THE training of water.

5. THE microclimates.

There notion of microclimate.

THE microclimates natural.

THE microclimates foresters.

THE lakes.

THE caves.

THE bogs.

THE microclimates artificial.

Microclimate urban.

THE hedges break wind.

THE gardens and the journey.

Case special : microclimate of one old limestone wall.

6. Relationship between vegetation, soil And climate.

Work staff :

Presentations/report outside of practical and practical sessions, practical work reports, practical work reports, dissertations (organized argumentation exercise), consultation and reading of bibliography (books, works, items, site website...), reports of exits, report of internshipWork staff.

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Fashion devaluation : Control continued, review, etc...(The weighting East left To appreciation of the team of training)

Title of the Master: Bioclimatology

Semester : 2

Entitled of the EU : EMU1 (Analysis spatial)

Subject title: Spatial information processingCredits : 2

Coefficients :2

Goals of teaching .

The objective of this module is to present the concepts, methods and tools implemented For analyze and represent there variability spatial phenomena natural.

Knowledge prerequisites recommended

Of the knowledge in geomatics and cartography

Content of there matter :

- Statistics spatial applied In there cartography
- News approaches of modelization spatial
- Systems of information geographical And management of the territories
- remote sensing

- Ground : analysis spatial To the scale of one bowl pouring

Work staff.

Application on a picture Google earth by A software of image processing

Fashion devaluation : 01 review of 1.5 h in END of semester (40 %), Work staff (40 %), expression oral and mind of synthesis (20 %)

Title of the Master: Bioclimatology

Semester : 2

Course title: UED 1 (laboratory analysis techniques) Entitled of there matter : Instrumental analysis

Credits : 2

Coefficients : 2

Goals of teaching :

Initiate students to take charge of research laboratories, familiarize themselves with the devices of measure, acquire THE various precautions For get of the values reliable And coherent In THE domain of the analyzes chemical, physicochemical And microbiological of the floors And of the waters.

Knowledge prerequisites recommended :

Awareness in chemistry analytic, physical And statistics elementary.

Content of there matter :

1. Introduction general on analysis instrumental in laboratory.
2. Conductimetry.
3. Potentiometry ion-selective.
4. Titration acid-base.
5. Titration redox.
6. Spectrophotometry.
7. Determination of pKa of one substance.
8. Dosage spectrophotometric (iron, sulphates And others).
9. Spectroscopy atomic.
10. Dosage by issue of flame (potassium and of sodium).
11. Electrophoresis of area.
12. Chromatography carbonated.
13. Dosage of salicylate of methyl.
14. Dosage of acids bold.
15. Chromatography liquid To high performance (HPLC).
16. Dosage of dyes.
17. Others dosages.

Assessment method: Continuous assessment, examination, etc...(The weighting is left to discretion of the team of training)

Title of the Master: Bioclimatology

Semester : 2

Course title: UED 2 (Cumulture simulations)Subject

title: Agronomic ModelingCredits : 2

Coefficients : 2

Goals of teaching :

To expect by the student how To the aid of the data of environment natural (climate, floor, works cultural, plants...) TO DO of the simulations on there plant biomass.

Knowledge prerequisites recommended :

Plant eco-physiologies, climatology, agronomic notions on fertilizers, ecology, agronomy..

Content of there matter :

Chap.1. : Introduction To there modelization

- Modelization dynamic.
- Modelization Statistics.

Chap.2 : Agro-climatology.

- Factors To control
- Interactions soil-plants And atmosphere.
- Influence of covered vegetal.

Chap.3 :Modelization agronomic

- Fashions of the developments of the crops
- Introduction of the data
- Different models
- Case : Model ticks (INRA France)

Fashion devaluation : Control continued, review, etc...(The weighting East left To appreciation of the team of training)

Work staff:

Learning And apps of the data on THE program ticks (INRA France) For TO DO of thesimulations on THE crops.

Work staff :

Learn the application of software ticks (INRA France)

Title of the Master: Bioclimatology

Semester : 2

Entitled of the EU : UET1

Subject title: Scientific English II.Credits : 1

Coefficients : 1

Goals of teaching :

This module offers a particular approach to improving reading skills and writing the English used in the scientific discourse genre specific to the theme of science of the environment And to learn to students there reading of texts scientists, comprehension To hearing, making grades And conferences.

Knowledge prerequisites recommended :

English standard And various mods of there speciality.

Content of there matter :

- To land there comprehension detailed of one text argumentative structure.
- To understand And to use of the concepts grammatical advances.
- How find THE vocabulary appropriate To each context.
- How of write of the texts argumentative structured.
- Work on analysis And writing of one article scientist. Methodology, vocabulary.
- Elaboration of abstracts And preparation of posters.
- Preparation And presentation of one mini communication oral (presentation of article Or project).
- To work with of the partners English speakers,
- To research A job at international (writing of one resume And a cover letter,preparation at the interview hiring).

Assessment method: Continuous assessment, examination, etc...(The weighting is left to discretion of the team of training)

Title of the Master: Bioclimatology

Semester : 2

Entitled of the EU : UET2

Subject title: Legislation.Credits : 1

Coefficients : 1

Goals of teaching :

Introduce the learner to regulatory concepts, the definitions and origins of legal texts and the knowledge of the penal consequences as well as the ability to read and understand a text of law And the ability to apply a regulations.

Knowledge prerequisites recommended :

Sets of the contents of there training

Content of there matter :

- Notions general on THE right (introduction At right, right penal).
- Presentation of legislation Algerian (references of the texts).
- General regulations (consumer protection law, hygiene, labeling and information, additives food, packaging, brand, safety, preservation).
- Regulations specific (work staff, exposed).
- Organizations of control (DCP, CACQUE, desk of hygiene, ONML).
- Standardization And accreditation (IANOR, ALGERAC).
- International standards (ISO, codex alimentarius, NA, AFNOR, phytosanitary codex and substances toxic...)

Fashion devaluation : Control continued, review, etc...(The weighting East left To appreciation of the team of training)

Title of the Master: Bioclimatology
Semester : 3
Title of the teaching unit: UEF1 (Physical environment) Subject title: Soil-plant-atmosphere
Credits : 3
Coefficients : 3

Goals of teaching .

The soil, plant and climate data are variables and the ETR is the translation of these three settings. The content of this module is to quantify the flow levels at each instant in THE SPAC.

Knowledge prerequisites recommended.

Science of the floors, agronomy, biophysiology And climatology.

Content of there material .

- The water And THE floor
- Relationship soil-plant-atmosphere
- Calculation of there consumption of one culture (ETR) by different methods
- Balance sheet water

Work staff.

Presentations on THE interactions lithosphere, biosphere And atmosphere.

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology
Semester : 3
Entitled of the EU : UEF1 (Environment physical) Subject title: Hydrobiochemical cycle
Credits : 6
Coefficients : 3

Goals of teaching .

Introduction to the bio-geochemical functioning of ecosystems in relation to the functioning hydrological And THE activities biological.

Knowledge prerequisites recommended :

required For power follow this education – Of the knowledge in biology, geology And chemistry

Content of there subject *(must indicate the detailed content of the face-to-face program And of personal work)*

- Hydrological functioning of underground and surface natural systems and structuring biogeochemicals.
- Process microbial In THE floors And THE aquifers.
- Physico-chemical and biological controls of biogeochemical cycles (carbon, nitrogen, phosphorus, suffers, oxygen).

Fashion devaluation : *Control continued, review, etc...(The weighting East left To appreciation of the training team)*

Title of the Master: Bioclimatology

Semester : 3

Unit title: UEF2 (Statistics applied to the environment) Entitled of there matter : Statistical hydrology

Credits : 6

Coefficients :3

Goals of teaching :

The course presents the different data analysis techniques, which allows students to using a statistical and probabilistic approach to rainfall-flow processes, with methods of treatment of spatio-temporal data adapted to problems of hydrology

Recommended prior knowledge (succinct description of the knowledge required to power follow this education – Maximum 2 lines).

Content of there material .

INTRODUCTION

1. Some definitions general statistical And calculation of the probabilities in hydrology
2. Notion event
3. Notion of probability
4. Variable random
5. Sampling
6. Frequencies

Chap.1 : ORGANIZATION OF A NETWORK HYDROMETRIC.

Organization general

Notion of one network hydrometric

Recordings of the data hydrological

Chap. 2 : Control of quality of the data rainfall .

Nature of the heterogeneities to which we can to carry remedy

Methods of filling of the shortcomings.

Accuracy of there data

Chap. 3 : Homogenization of the data rainfall

Terms prerequisites To homogenization

Conduct of the calculations For extension of the series of totals rainfall annual

Means of appreciation of gain got by extension

Remarks on there convenient of the extension.

Chap. 4 : Laws of the probabilities applied in hydrology.

4.1 Notion And features of one law of probability

probabilities total

probabilities composed

Laws To two variables

Methods estimate of the settings In THE laws To 1 variable.

Intervals of trusts.

Chap. 05: Analyzes frequency.

Notion of the frequencies.

Calculate of the frequencies
Period of feedback.
Formulas of the frequencies empirical.
Kinds of the frequencies

Chap. 6: Adjustment chart of the functions of distribution.

At different step of time.
Variables spatial

Chap.7 : Testing statistics applied in hydrological.

7.1 Note assumptions, thresholds of meaning And of the testing statistics
7.2. Testing of conformities of the adjustments
Testing of stationarities
Testing of trends

Work staff.

Mini-project adjustment of the data Hydrometeorological

Title of the Master: Bioclimatology

Semester : 3

Course title: UEF2 (Statistics applied in the environment)

Subject title: Sampling and experimentation. Credits: 4

Coefficients : 2

Goals of teaching :

Introduce students to sampling and sample collection methods, teach them how to establish an experimental protocol and carry out the experimental part well of one project.

Knowledge prerequisites recommended :

Statistics, techniques of analyzes and of conservation of the samples.

Content of there matter :

Chapter 1 : Kinds of samples.

Samples random (probabilistic) For THE organisms fixed.

Samples random simple.

Samples systematic.

Samples laminate.

Samples in clusters.

Samples To two degrees.

Samples by quotas.

Samples of volunteers.

Samples At judged.

THE sub-samples.

Sampling For THE organisms mobiles.

Relationships between THE phases of one research of ground.

Chapter 2 : Maps of experience.

Method experimental.

Experience.

Experience measuring A phenomenon natural.

Experience controlled.

Factors controlled/random.

Example of factors controlled.

Example of factors random.

Presentation of data.

Series statistics simple.

Terminals, interval, clues.

Series statistics doubles.

Chapter 3 : Plan sampling.

THE elements of one plan sampling.

Definition of the goals.

Accuracy and workforce of the samples.

Determination of the minimum workforce.

Fixation of the workforce For the study comparative.

Comparison of methods.

Estimate And efficiency of the methods.

Normality of the distributions of samplings.

Chapter 4: Typical plan of an experimental or sampling protocol.Part 1 :

Example kind.

1. Identification of protocol.
2. Theme of the study.
3. Objective.
4. Factors studied And To control.
5. Material experimental.
6. Device experimental Or sampling.
7. Variables measured.
8. bet in work.
9. Treatment statistical of the results.
10. Diffusion.
11. Means materials.
12. Determination of staff necessary.

Part 2 : Case of study.

Fashion devaluation : Control continued, review, etc...(The weighting East left Tothe appreciation of the team of training)

Title of the Master: Bioclimatology

Semester : 3

Title of the teaching unit: UEM 1 (Geographic Information Systems

"GIS")Entitled of there matter : Geostatistics applied.

Credits : 2

Coefficients : 2

Goals of teaching :

Learn to students THE analyzes of there structure spatial phenomenons natural, of make correct spatial estimates and assess the quality of map accuracy elaborated.

Knowledge prerequisites recommended :

Cartography, statistics, be initiated in geostatistics And Good mastery of the tool computer science

Content of there matter :

1. Historical And some reminders.
 2. Ratings of forms.
 3. Theory : infer a law spatial.
- Comparative statistics classic And geostatistics.

Hypotheses on a function random.
4. Analysis of structures spatial.
Stationarity.
Estimators of Dependencies spatial.
Anisotropy And derivative.
5. Modelization of structures spatial.
Adjustments.
Choice of models.
6. Estimate.
Interpolate by Kriging.
Properties of Kriging linear.
Results of Kriging.
Estimate by Kriging.
Kriging Universal.
Kriging Ordinary.
Simulation.
Simulation No conditional.
Simulation conditional.

Work staff.

Application of the software GIS And do of the krigings on of the measures spatial

Title of the Master: Bioclimatology

Semester : 3

Entitled of the EU : UED (Sustainability environmental)

Subject title: Environmental policy and sustainable development Credits : 2

Coefficients :2

Goals of teaching .

THE course To For objective of to dispense to students a training relative to main legislations in matter of the environment, to understand THE problems environmental And to propose THE solutions required

Knowledge prerequisites recommended.

Management Integrated of the waters, legislation, policy general.

Content of there material .

- Introduction To there policy environmental And At development sustainable
- Study economic of the projects environmental Technical devaluation monetary(principles generals And techniques specific)
- Legislation national And international
- Strategies of development sustainable

Title of the Master: Bioclimatology

Semester : 3

Entitled of the EU: UET 1

Subject title: Entrepreneurship.

Credits : 1

Coefficients : 1

Goals of teaching :

Initiate the student At assembly of project, her launch, sound follow up and his achievement.

Knowledge prerequisites recommended :

Together of content of there training.

Content of there matter :

Introduction

1. Environment economic And legal

Notions keys

Introduction

Fundamentals

Innovation, new engine of growth

Creation corporate innovative - facts And figures

Entrepreneurship social And solidarity : A field To explore

Introduction

A history very rich

A frame institutional And legal in evolution
THE choice of one Status legal For the company - criteria...

Introduction

Undertake only Or with of the associates

Risks For the contractor And his relatives

Status social of the contractor

Cost And difficulty of construction of the company

Administration And management of the company

Scalability of there structure

2. Steps of Creator innovator

Methods And good practice For innovate effectively

Innovation

Management of project

Aspects legal

Intelligence economic

Be convincing

Examples

Of result of research To innovation

Introduction

Cycle of one project

Identify THE apps

Example 1

Example 2

Profile of Creator - project staff, factor of motivation...

Introduction

Approach sociological of there creation corporate

"Embedded" social of project innovative

Factors of hit Or of failure - importance of the networks...

Features of the creations companies innovative

3. Build a offer commercial

Strategies access At market

Read And to understand her market

Of innovation At product - A process No linear

Identification of the targets And of the partners

Marketing technological - tools methodological

Introduction

Approach marketing mixing

Market - segmentation

Analysis functional

Analysis competitive

Model economic

Value And price

Figure business And threshold of profitability

4. Tools accountants And forecast financial

Notions keys

Introduction

Needs of funding

Balance sheet - not To not

Balance financial of one business

Conclusion

Business plan

A tool For convince

Elaboration of business plan

Deepening

Introduction - analysis of there profitability And of risk...

- Sales intermediaries of management (GIS)
- Threshold of profitability Or point dead
- Ratios
- Scoring
- Case convenient

5. To secure legally A project

- Introduction At chapter - Maturation of project
- innovations protectable And fashions of protection
- Panorama general
- THE rights of the third
- Strategy of property intellectual
- Introduction - management of the rights of IP
 - Protection by secret And by patent
- Tools of property intellectual
- Relationship business / establishment of research
- Introduction
 - Relationships contractual
 - Property of the inventions
 - Assignment And Licence

6. Funding of project

- Devices of funding audience
- Introduction
 - Funds of maturation in Brittany
 - Competition of Ministry of Teaching Superior and of there...
- Incubator Emergys
 - Others financing
 - Chain of funding
 - Actors main
- Business angels
 - Investors in capital risk
- Conclusion

7. Devices accompanying

- Devices regional - examples bretons
- reindeer Atalanta - technopole
 - Genesis And goals of the incubator Emergys
- National system - OSEO
- Introduction
- Innovation
- Guarantee
 - Funding

8. Table round of fence - returns of experience

- Presentation of the creators companies
- Connections between the company And the university
- Strengths And weaknesses of project
- Business plan
- Life of project
- Construction of there policy commercial

Title of the Master: Bioclimatology

Semester : 3

Entitled of the EU : UET2

Subject title: Tutored mini-project

Credits : 3

Coefficients :3

Goals of teaching .

-Writing And TO DO A synthesis bibliographic.

-Preparation At memory

- The principle of the internship is the acquisition of aptitude for life in a company or within alaboratory

- Aptitude To take of the responsibilities

- Principles integration In a crew of reception.

Knowledge prerequisites recommended .

All THE materials taught

Content of there subject *(must indicate the detailed content of the face-to-face programAnd of personal work)*