REPUBLIC ALGERIAN DEMOCRATIC AND POPULAR

MINISTRY OF TEACHING HIGHER EDUCATION AND SCIENTIFIC RESEARCH

ENGINEER TRAINING OFFER

Coastal Engineering Development

Establishment	Faculty / Institute	Department
National Higher School of Marine Sciences and Coastal Development (ENSSMAL)		**Environment and Development**

Field: Sciences of earth and of The Universe (STU)
Sector: Geography and Development of Territory (GAT)

Specialty: Coastal Engineering and Development

Academic Year: 2023-2024

الجمهورية الجزائرية الديمقراطية الشعبية

وزارة التعليم العالي والبحث العلمي

عرض تكوين مهندس

الهندسة الساحلية و التهيئة

المؤسسة	الكلية/ المعهد	القسم
المدرسة الوطنية العليا لعلوم البحر و تهيئة الساحل		**قسم البيئة وتهيئة الساحل**

الميدان :علوم الأرض و الكون
الشعبة : جغرافيا وتهيئة الاقليم

التخصص: الهندسة الساحلية و التهيئة

السنة الجامعية: 2023 - 2024

SUMMARY

I. Identity Sheet

1. Location of training:

National Higher School of Marine Sciences and Coastal Development

Department: Environment and Development

Coordinator :

Name & First name : Mezouar Khoudir
Grade : Professor
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E-mail : **mezouarkhoudir@yahoo.fr** / **khoudir.mezouar@enssmal.edu.dz**

2. Training Partners :

Partners nationals

Establishment of teaching superior

- Establishments academics :

1. University of The sciences And technology Houari Boumediene (USTHB, Algiers) : faculty of science of earth, of geography And of The development of territory & faculty of The biological sciences .
2. University from Annaba : department of The sciences of The sea.
3. University of Mostaganem : department of The sciences of The

Wed. 4. University of Bejaia:

5. ENSH School National Superior Hydraulics (Blida)
6. School National polytechnic from Algiers : department Genius civil And hydraulic department

Companies And others partners socio-economic:

Institution	Domain of activity	Nature And terms
Laboratory of Study Maritime LEM	Genius coastal	Framework convention
Center of Research in Sciences Pharmaceuticals (CRSP).	Pharmaceutical Sciences	Framework convention
GITRAMA	Works maritime	Framework convention
Center of Research Nuclear from Algiers (CRNA)	Research Nuclear	Framework convention
Direction general of The environment	Environment marine	Framework convention
Police station national of Coastline	Management / monitoring of coastline	Framework convention
Agency Spatial Algerian ASAL	Mapping/ remote sensing	Framework convention
CNRDPA (Bou- Ismaïl)	Fishing And aquaculture	Framework convention
CNRDB (Algiers)	Transportation maritime	Framework convention
Direction general of The environment	Biodiversity And management ecosystems	Framework convention
Direction general of fishing	Fishing And aquaculture	Framework convention
PN Taza (Jijel)	Protected area	Framework convention
PN Gouraya (Bejaia)	Protected area	Framework convention
PN Big winds (Algiers)	Protected area	Convention frame

ISM (Bou- Ismaïl)	Transportation maritime	Convention frame
CNRDB (Algiers)	Diversity biological	Convention frame
ONEDD (Algiers)	Development sustainable	Convention frame
Company of The Waters And of Sanitation from Algiers (SEAAL	Waters And of Sanitation	Convention frame
Agency National of The Waste (AND).	Management of The waste	Convention frame
Convention frame	Transportation maritime	Convention frame
IEC SEMESTERAOUI	Environment	Convention frame
SPA CCS Industry.	Environment / industry	Convention frame
NEPHROPS Engineering Environmental.	Environment	Convention frame
Institute National Superior of The Fishing And of Aquaculture (INSPA).	Fishing And Resources Fisheries And aquaculture	Convention frame
Institute of Technologies of The Peaches And of Aquaculture (ITPA Collo).	Fishing And Resources Fisheries And aquaculture	Convention frame
Direction of The Fishing And of The Resources Fisheries from Ain Temouchent.	Fishing And Fisheries Resources	Convention frame
Spa Crops Marines – CULTMARE.	Mariculture	Convention frame
Association For The Research, Information and Training Underwater (REEF).	Diving underwater	Convention frame
Club of diving underwater KALYPSO	Diving underwater	Convention frame

International Partners :

- IFREMER, in course of realization of convention
- University of Paris East Creteil (UPEC), France
- INSA of Lyon, France
- Institute National of The Sciences And Technology of The Sea (INSTM), Tunisia
- University of Brittany Western Brest
- Center European of Research And Teaching of The Geosciences of Environment, Aix-Marseille University, France: effective collaboration between The two institutions since 2014. – Institute
- University European of The Sea (IUEM), university of Brittany Western, France
- University from Istanbul (Türkiye).
- University from Ankara (Türkiye).
- University Akdeniz (Antalya, Türkiye).
- University International of Sea (France).
- University of Nouakchott Al Aasria (Mauritania).

3. Training Context and goals

A. Admission conditions

The training destiny to : Students who have been admitted through The national entrance exam *(including those from The integrated preparatory classes of ENSSMAL and preparatory classes in The STU & SNV fields)*, and who meet The minimum average grade required for entry into The specialty.

B. Training Goals

The objective of this course is to train specialists in the physical study of the coastline and to understand natural processes and their evolution in the context of climate change and anthropogenic pressure. To train specialists in coastal dynamics, coastal engineering and geotechnics, coastal risks and resources, innovative protection solutions and rational coastal management. This coherent whole aims in particular to improve risk management and sustainable development. In addition, this course provides a broad scientific vision, which is necessary for carrying out diagnoses of the physical coastal environment: hazards, functioning, changes. Finally, students must be able to take the initiative in proposing solutions and alternatives for coastal protection. We prepare students for careers in fundamental research, coastal management and planning, and coastal and port engineering. We place the development of critical thinking at the heart of our training, so that we can deal with the totally strategic environmental issues of 2050.

C. Profiles and Skills job targeted

Specific skills

- To understand natural hazards (marine submersion, coastal erosion, line mobility coast) with emphasis on instrumentation and digital data processing.
- characterization And The quantification of The risks in area coastal And port (flooding/submersion/erosion),
- Measure and model coastal hydrodynamic processes (swells, currents, wind, etc.),
- Design and sizing of coastal protection structures (dykes, breakwaters, groins, walls, etc.).
- Inspection And design of The works port (jetties, docks, terminals, And mooring posts , etc.)
- Interpretation of The funds sailors by integration of data geophysical, geological and geotechnical (in situ and in laboratory)
- Rehabilitation of beaches and dunes (artificial replenishment, geotextiles, geotubes, etc.)
- management And quantification of The resources abiotic coastal (stock sandy, marine energies),

- management of coastal areas using The most recent techniques and strategies, particularly in terms of environmental and structural diagnosis,
- a detailed understanding of what coastal hydromorphodynamics is, with an emphasis on rigor in The scientific approach and The development of good critical thinking,
- To use of The tools geomatics (mapping automatic)
- Identify and analyze The effects of anthropogenic pressures and climate change on coastlines
- Know and be able to apply The principles of data acquisition from instrumentation linked to marine investigation (multibeam echo sounder, current meter, sediment traps, etc.)
- To know THE bases of legislation And know establish of The links with of The responsible local authorities, state bodies and public laboratories or design offices
- Design and drive a project.

Transverse skills

- Acquisition of a cultural background enabling a multidisciplinary approach to The marine environment. This background includes tools and a coherent set of specialized knowledge on The processes that affect The ocean system and how human societies have modified and continue to modify Them. It leads to an ability to analyze and/or model complex situations by implementing The appropriate tools.
- Ability has perform research multidisciplinary information
- Ability has design and to put in artwork A project in multidisciplinary team.
- Ability has communicate his results in French And in English

D. Regional and national employability potential of diplomas

The future graduates of ENSSMAL (Engineer in Coastal engineering And Development) have great potential to integrate into national economic sectors

- The municipalities coastal are devoid of frames specialized In THE domain sailor, They alone can absorb hundreds of graduates
- The ministry of The works public And all The sectors related has This ministry (The Coastal DTP)
- Ministry of The environment And all The directions of The environment focused on The coastline
- Ministry And directions of The peaches
- Ministry And directions tourism
- Ministry of forests And of The resources in water
- Institutes of vocational training.
- Offices of studies specialized In The studies maritime.
- Services HSE of The sites and complexes industrialists.
- Cells of management of areas protected or of reserves natural.
- Companies restoring natural ecosystems.

E. Bridges to other specialties

The training offer aims to train engineers in the field of Geography and development of Territory, particularly in the coastal and offshore fields. Therefore, the student has the opportunity to pursue higher education in the field of earth and universe sciences, particularly marine geology, coastal engineering, geomorphology, etc..

F. Indicators of followed by training

To ensure the modular system works and integrates seamlessly, a Coordinating Teaching Committee will be established for each semester and for each training profile. The Coordinating Teaching Committee will oversee the education of a group of students enrolled during the semester.
It meets once a week for the first three weeks, and at least once every three weeks Thereafter. Each meeting results in a report of decisions and proposals which is sent to the department and to the academic department.
A schedule will be established at the beginning of the semester or year to specify which meetings will be held in the Subcommittee and which will be held in The Committee. The operation of a module will require contact between the module leader and the assistants responsible for tutorials and practical work within the module's teaching team.
At The end of the course, the student will present their final dissertation to a jury committee to evaluate their work and decide on its success.

G. Supervisory capacity

30 students

4. Means available humans

A. Teachers of The establishment involved In The specialty

Name , First name	Diploma	Grade	Type of intervention	Signing
Mezouarkhoudir	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
Boulahdid Mostefa	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
Bachari- Houma Fozia	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
LouanchiFeriel	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
Kosher Mohamed	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
Grimes Samir	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
Fezaa Nassima	Doctorate / HDR	Professor	Course, TD, TP, ES, EM	
Ghazi Malika	Doctorate / HDR	MCA	Course, TD, TP, ES, EM	
Ait Aissa Djamila	Doctorate	MCA	Course, TD, TP, ES, EM	
OthmaniHouseyn	Doctorate	MCB	Course, TD, TP, ES, EM	
Abeddaum Hakima	Doctorate	MCB	Course, TD, TP, ES, EM	
Laoudj Abdeselam	Doctorate	MCB	Course, TD, TP, ES, EM	
FernaneLounes	Doctorate	MCB	Course, TD, TP, ES, EM	
Chaa Halima	Doctorate	MCB	Course, TD, TP, ES, EM	
Ben zouaiSihem	Doctorate	MCB	Course, TD, TP, ES, EM	
Keraghel Mahdia Asma	Doctorate	MCB	Course, TD, TP, ES, EM	
Mokhbi Dahbia	Doctorate	MCB	Course, TD, TP, ES, EM	
Maouel Djamila	Doctorate	MCB	Course, TD, TP, ES, EM	
Boumaour Amina	Doctorate	MCB	Course, TD, TP, ES, EM	
Dahmaniabdelalim	Master	MAA	Course, TD, TP, ES, EM	
Bouaicha Farid	Master	MAA	Course, TD, TP, ES, EM	
Zerrouki Mohamed	Master	MAA	Course, TD, TP, ES, EM	
Zeghache Abdelkader	Master	MAA	Course, TD, TP, ES, EM	
Sengouga Amina	Master	MAA	Course, TD, TP, ES, EM	
Ademamel Amina	Master	MAA	Course, TD, TP, ES, EM	
HaridRomaisa	Doctorate	MAB	Course, TD, TP, ES, EM	

B. External supervision:

Name , First name	Diploma / specialty	Grade	Type of intervention	Establishment of attachment
Hamdane Yacine	**Doctorate / HDR- Geomorphology**	**Teacher**	**Courses, tutorials, EM**	**USTHB**
Attroune Farid	**Doctorate / HDR - Geology**	**Teacher**	**Courses, tutorials, EM**	**USTHB**
HellalMoustepha	**Doctorate / HDR - Geology**	**Teacher**	**Courses, tutorials, EM**	**USTHB**
Guerfi Mokhtar	**Doctorate / HDR – Sig Cartography**	**Teacher**	**Courses, tutorials, EM**	**USTHB**
MIHOUBI Mostefa Kamal	**Doctorate / HDR - Hydraulic**	**Teacher**	**Courses, tutorials, EM**	**UNSH Blida**
Ghoggali Salim	**Doctorate – digital**	**MCB**	**Courses, tutorials, EM**	**ENSEREDD Batna**

5. Material resources specific available

A- Educational laboratories and Equipment : Form of The equipment existing teaching materials for The practical work of The planned training (1 sheet per laboratory)

Titled of laboratory: Laboratory methods analysis

	Designation	Quantity
1	Spectrometer absorption atomic (SAA) (Perkin Elmer-PinAAcle 900H)	1
2	Chromatograph in phase liquid has high performance (HPLC) (Perkin Elmer – Altus A- 10)	1
3	Chromatograph ionic (Shimadzu)	1
4	Chromatograph in phase gaseous (Shimadzu)	1
5	Cooler has traffic of water (LAUDA -MC600)	1
6	Freeze dryer with 4 trays of 250mm of diameter with pump has empty	1
7	Generator of hydrogen (HyGen 600)	1
8	Generator combined Nitrogen/Air (NitroAir)	1
9	Distiller (water pure)	1
10	Oven (Binder)	1
11	Host of chemistry	1

Titled of laboratory: Laboratory of Geology and Development

No.	Designation (By Order Alphabetical)	Type	Quantity	Brand
1	Equipment of Calcimetry		1	
2	Device Casagrande (limit d'Atterberg)	82744/2004	1	ELE International
3	Equipment equivalent of sand	S158-13	1	MATEST
4	Balance	CD -11	1	OHAUS
5	Balance precision	adventurer	1	OHAUS
6	Dumpster Van Veen Average		1	HYDRO- BIOS
7	Dumpster Van Veen Small		1	HYDRO- BIOS
8	Comparator centesimal	SC 25	1	BORLETTI
9	Conductivity meter with probe	4071	1	JENWAY
10	Cooler	ICE BOX 42L	1	Fields
11	Current meter	FP101	1	OVERALL Water SIGMA Sport
12	Oven	42200010	1	ProLabo
13	Oven	DHG 9053A	1	Jeulin
14	Oven	UN110	1	Memmert
15	Binocular Loupe	LFZ	2	Optech
16	Luxmeter	7137	1	PHYWE
17	Luxmeter-probe	12107.01	1	PHYWE
18	Pressure gauges		2	
19	Hammer of geology		14	ESTWING
20	microscope optical		1	Euro max
21	Oedometer (Device shear)	S260	1	MATEST

22	Hot plate	H3110	1	LGH
23	Penetrometer (limit of liquid)	S165	1	MATEST
24	pH meter with probe	pH56	1	WTW
25	Proctor : Lady And mold		1	
26	Field vane shear device.	THE 26- 2261	2	TORVANE
27	Parallax Bar Stereometer		2	TOPCON TOPCON
28	Stereoscope	WILD ST4 / MS-3 / MS-3/ MS-3 / MS- 3 / MS-3 / MS -3	7	LEICA_TOPCON / TOPCON / TOPCON / TOPCON / TOPCON / TOPCON
29	Stereoscope of pocket to mirrors	319991	9	WILD HEERBRUGG
30	Series of Sieve in stainless steel	40 µm- 80000 µm	35	Retsch
31	Sifter	AS200 basic	2	Retsch
32	Theodolite		1	SANDING
34	Theodolite	DT600	1	SOKKIA
35	Theodolite		1	BOIF
36	Thermometer of ground	1188	3	

Titled of laboratory : Laboratory Chemistry /Physical

No.	Designation (By Order Alphabetical)	Kind	Quantity	Brand
1	Agitator magnetic heating	CB162	1	STUART
2	Agitator magnetic heating	F20500162	1	VELP SCIENTIFIC
3	Cupboard of storage (Acid Base)		1	
4	Balance precision	ABS 220-4N	1	KERN
5	Bars magnetized		8	
6	Heated ball mono job	655	1	NAHITA
7	DCO	6 positions - DCO10119	1	FILE
8	DCO	6 Positions- (ECO6)	1	VELP SCIENTIFIC
9	Desiccator		1	
10	Distiller	Puranity YOU 6	1	VWR
11	Oven	UN55	1	MEMMERT
12	Extractor hood	SPL	1	ASEM
13	Mask has gas		1	
14	Mixer	RW20.N	1	KIKA
15	Mortar	porcelain	5	
16	Metal clamp		2	
17	Hot plate	HB110	1	LHG
18	Pump has empty	NO26.1.2AN.18	1	KNF
19	Propipette 20ml		7	
20	Propipette 25ml		2	
21	Refrigerator	HS -208F	1	MIDEA
22	Spectrophotometer	2120UV	1	OPTIZEN

23	Thermometer has mercury		4	
24	Ultrasound	2510	1	BRANSON

Titled of laboratory : Laboratory Chemistry /pollution

No.	Designation (By Order Alphabetical)	Kind	Quantity
1	Agitator has light bulbs to decant	06 Agitlec positions	1
2	Kern Balance	Kern	1
3	Sigma centrifuge	Sigma	1
4	Heated ball	Mono 'Nahita'	1
5	Heated ball	3 'BI' positions	1
6	Heated ball	BI 03 positions	1
7	Heated ball	Nahita mono	1
8	Conductivity meter	Hanna instruments EC214	3
9	Conductivity meter	of pallaise WTW inolab 1103	1
10	Conductivity meter benchtop	WTW inolab	1
11	Conductivity meter Hanna	Hanna	2
12	Crucible with cover	Porcelain	12
13	Desiccator		1
14	Distiller includes 01 heating balloon with 06 positions, 06 flat bottom balloons of 250ml , 06 tubes refrigerants And 06 columnsdevigreux	WiseTherme	1
15	Oven Memmert UM600		
16	Flame photometer	Jenway	1
17	Oven mitten	FH05080318001	1
18	Four a Wise mitten Therm	Wise Therm	1
19	Micropipettes bio-Control 100-1000µl	Bio control	3
20	Micropipettes bio-Control 10-100µl	Bio control	0
21	Micropipettes bio-Control 5- 50µl	Bio control	3
22	Micropipettes Smart from 100-1000µl	Smart	0
23	Mortar	In porcelain	0
24	Oximeter benchtop	WTW inolab	1
25	pH meter Hanna	Hanna	1
26	Pliers		5
27	Plate heating GM	heating	1
28	Plate magnetic heating Fisher	magnetic heating	1
29	Plate magnetic heating KIKAmagwerke	magnetic	1
30	Plate magnetic heating Stuart	magnetic heating	2
31	Pump empty KnFNeubergerPmax	No. 22AN18	
32	Racks	in plastic	0
33	Racks	in stainless steel	4

34	Job of filtration with tray receiver	Nalgene	1
35	Propipettes	Pobel 25ml	1
36	Propipettes	Pobel 10ml	6
37	Ramp of filtration 03 positions	stainless steel 03 positions	1
38	Ramp of filtration in plastic	in plastic	1
39	Reactor DCO 06 positions includes 5 tubes refrigerants, 6 tubes COD reactor	VELP Scientifica	1
40	fridge condor DRC 450		1
41	Spatulas	in stainless steel	6
42	Spectrophotometer of lab and accessories		1
43	Spectrophotometer UV- Visible	Shimadzu	1
44	Stand base in metal For desk	in metal	2
45	Thermometer digital	Hanna	1
46	Turbidimeter benchtop	Hanna	1
47	Vortex TopMix	Fisher	1

B. Work placements and in-company training

Internship Location	Number of Students	Duration of Internship
Study of Soil Geotechnical		
National Center for Applied Research in Earthquake Engineering	(4th year) (in groups of 5 students)	One week
Study of Marine Environment Quality through Various Indicators		
Nuclear Research Center of Algiers (CRNA, Algiers)	2 (4th year)	30 days
National Coastal Commission (Algiers)	2 (4th year))	30 days
National Observatory for Environment and Sustainable Development (ONEDD)	3 (4th year)	30 days
National Research and Development Center for Fisheries and Aquaculture (Bou-Ismail, Tipaza)	3 (4th year)	30 days
Taza National Park (Jijel)	3 (4th year)	30 days
Grands Vents National Park (Algiers)	3 (4th year)	30 days
Renewable Energy Development Center (Algiers)	3 (4th year)	30 days
National Agency for Nature Conservation (Algiers)	3 (4th year)	30 days
National Coastal Commission (Tipaza)	3 (4th year)	30 days
Completion of Final Year Thesis:		
Maritime Studies Laboratory (LEM)	2 (5th year)	6 months
Gouraya National Park (Bejaia)	2 (5th year)	6 months
Taza National Park (Jijel)	2 (5th year)	6 months
El Kala National Park (El Tarf)	2 (5th year)	6 months
Laboratory for the Conservation and Valorization of Marine Resources	5 (5th year)	6 months
Laboratories of Marine and Coastal Ecosystems	5 (5th year)	6 months
Nuclear Research Center of Algiers (CRNA, Algiers)	1 (4th year)	6 months
National Coastal Commission (Algiers)	1 (4th year)	6 months
National Observatory for Environment and Sustainable Development (ONEDD)	1 (4th year)	6 months
National Research and Development Center for Fisheries and Aquaculture (Bou-Ismail, Tipaza)	2 (4th year)	6 months
Taza National Park (Jijel)	2 (4th year)	6 months
Renewable Energy Development Center (Algiers)	1 (4th year)	6 months
National Coastal Commission (Tipaza)	1 (4th year)	6 months

C. Research and training support laboratories

Marine and Coastal Ecosystems Laboratory - ENSSMAL
CODE: C 32200200
Date : **Laboratory Director's Opinion:**

Laboratory for The Conservation and Enhancement of Marine Resources - ENSSMAL
CODE: C 3210100
Date : **Laboratory Director's Opinion:**

D. Projects of research of support At Training:

No.	PRFU code	Duration	Chief of project	Titled
1	D00L03ES160920180004.	2018- 2021	BOULAHDID. M.	Study of pollution And of fertility of waters of The ribs power plants Algerian women
2	D00L03ES160920180003.	2018 - 2021	REFES. W.	Modeling of distribution spatio-temporal of The species invasive marines on THE Algerian coast
3	D00L03ES160920180002.	2018 - 2021	ALOUACHE. S.	Microorganisms aquatic For biotechnological applications
4	D00L03ES160920190001.	2019 - 2022	SEMROUD. R.	Herbariums has Posidonia oceanica : tools for biomonitoring of coastline Algerian
5	D00L03ES160920200002.	2020-2023	HEMIDA. F.	Management systemic of The fishery resources
6	D00L03ES160920200001.	2020 - 2023	BACHARI. F.	The monitoring And valuation of The impact environmental : Methodological and normative approach
7	D00L03ES160920220001	2022 - 2025	REFES W.	Bet in evidence of The breeding performance of different strains of Artemia salina identified in Algeria
8	D00L03ES160920220002	2022-2025	BOULAHDID. M.	Study of pollution and eutrophication In The waters of The ribs power plants Algerian women.
9	E03L01ES160920220002	2022 - 2025	FEZAA. N.	Geodynamic, morphological and sedimentary evolution of The coastline center Algerian
10	E03L03ES160920220001	2022 - 2025	MEZOUAR K.	The multi-risk approach for assessing The vulnerability of territories. Studies of case in areas coastal.

E. Spaces of works staff and TIC:

The school provides the following resources:

- A library well-stocked with educational materials to support learning, including a reading room with a capacity of 100 seats.
- A multimedia room with 40 workstations and Wi-Fi access.
- 04 computer labs, each with a capacity of 25 seats, fully equipped with 25 computers and Wi-Fi access.

II – Semester Teaching Organization Sheet

1. Semester 1

Unit Teaching	VHS	VH weekly				Coefficient	Credits	Assessment method	
	14-16 week	C	TD	TP	Others			Control Continuous	Exam
EU fundamentals									
UEF1									
Subject 1 Geotechnics: Soil Physics and Hydraulics	45 h	1h30	1h30	1h30		3	4	50%	50%
Matter 2 : Marine Geochemistry	45 h	1h30	-	1h30		2	4	50%	50%
Matter 3 : Resistance Materials	30 h	1h30	1h30	1h30		1	2	50%	50%
Matter 4 : Marine ecology	45 h	1h30	-	1h30		2	4	50%	50%
EU methodology									
UEM1(O/P)									
Matter 1 : Treatment And data analysis	45 h	1h30	1h30			2	4	50%	50%
Matter 2 : Digital modeling	60 h	1h30	1h30	1h30		3	5	50%	50%
Matter 3 :GIS / Mapping 1	45 h	1h30	1h30			2	4	50%	50%
EU transverse									
UET1(O/P)									
Matter 4 : Oceanographic Instrumentation	30 h	1h30	1h30			1	2	50%	50%
EU discovery									
UED1(O/P)									
Matter 1 : Scientific English 1	30h	1h30	1h30			1	1	50%	50%
Total Semester 1	375 h					17	30		

2. Semester 2

Unit Teaching	VHS	VH weekly				Coefficient	Credits	Assessment method	
	14-16 week	C	TD	TP	Others			Control Continuous	Exam
EU fundamentals									
UEF1									
Matter 1 : Dynamic oceanography	40 h	1h30	-	1h30		2	4	50%	50%
Matter 2 : Coastlines and societies : evolution, development	45 h	1h30	-	1h30		2	4	50%	50%
Matter 3 : Geotechnics: soil mechanics	45 h	1h30	1h30	1h30		2	4	50%	50%
EU methodology									
UEM1(O/P)									
Matter 1 : Fluid dynamics	45 h	1h30	1h30			2	4	50%	50%
Matter 2 :Concrete in maritime site	45 h	1h30	1h30	1h30		2	4	50%	50%
Matter 3 : Watershed Hydrology	45 h	1h30	1h30			2	4	50%	50%
Matter 4 : Programming	35 h	1h30		1h30		2	2	50%	50%
EU Transversal									
UET1(O/P)									
Matter 1 : Research methodology	15h	1h30				1	1	50%	50%
Matter 2 : Climatology and climate change	25h	1h30	1h30			**1**	**1**	50%	50%
EU discovery									
UED1(O/P)									
Matter 1 : Scientific English 2	30h	1h30	1h30			1	2	50%	50%
Total Semester 2	375 h					17	30		

3. Semester 3

Unit Teaching	VHS	VH weekly				Coefficient	Credits	Assessment method	
	14-16 week	C	TD	TP	Others			Control Continuous	Exam
EU fundamentals									
UEF1									
Matter 1 : Coastal engineering	60 h	3 hours	-	1h30		3	4	50%	50%
Matter 2 : Coastal and underwater geomorphology	60 h	3 hours	1h30			3	4	50%	50%
Matter 3 Coastal development	45 h	1h30	-	1h30		2	4	50%	50%
EU methodology									
UEM1(O/P)									
Matter 1 : Marine hydrodynamics	45 h	1h30	1h30			2	4	50%	50%
Matter 2 : Applied modeling	45 h	1h30	1h30			2	4	50%	50%
Matter 3 :Remote sensing	45 h	1h30	1h30			2	4	50%	50%
EU discovery									
UED1(O/P)									
Matter 1: Development sustainable	30h	1h30	1h30			1	2	50%	50%
Matter 2 : Projects management	22.5h	1h30	1h30			1	2	50%	50%
Matter 3 : Scientific English 3	22.5h	1h30	1h30			1	2	50%	50%
Total Semester 3	375 h					17	30		

4. Semester 4

Unit Teaching	VHS	VH weekly				Coefficient	Credits	Assessment method	
	14-16 week	C	TD	TP	Others			Control Continuous	Exam
EU fundamentals									
UEF1									
Matter 1 : Coastal sedimentary dynamics	45 h	1h30	-	1h30		2	4	50%	50%
Matter 2 : Marine geotechnics	45 h	1h30	-	1h30		2	4	50%	50%
Matter 3 : Geology of The seabed	30h	1h30	-	1h30		1	2	50%	50%
EU methodology									
UEM1(O/P)									
Matter 1 : design and computer-aided drawing (CAD/CAM)	45 h	1h30		1h30		2	4	50%	50%
Matter 2 :GIS Mapping 2	45 h	1h30	1h30			2	4	50%	50%
Subject 3 : Artificial Intelligence applied to geosciences	50 h	1h30		1h30		3	4	50%	50%
Matter 4 : Internship	60 h					3	4		
EU discovery									
UED1(O/P)									
Matter 1 : Law of The Sea	25h	1h30				1	2	50%	50%
Matter 3 : Scientific English 4	30h	1h30	1h30			1	2	50%	50%
Total Semester 4	375h					17	30		

5. Semester 5

Unit Teaching	VHS	VH weekly				Coefficient	Credits	Assessment method	
	14-16 week	C	TD	TP	Others			Control Continuous	Exam
EU fundamentals									
UEF1									
Matter 1 : Design maritime structures	60 h	3 hours	-	1h30		3	5	50%	50%
Matter 2 : Physical modeling	45 h	1h30	1h30			2	4	50%	50%
Matter 3 : Coastal Zone Management	45 h	1h30	1h30			2	4	50%	50%
Matter 4 : Dredging and rock removal in The marine environment	30 h	1h30	1h30			2	2	50%	50%
EU methodology									
UEM1(O/P)									
Subject 1 : Diagnosis and monitoring of coastal structures	30 h	1h30	1h30			2	2	50%	50%
Matter 2 : Marine renewable energy	45 h	1h30	1h30			2	4	50%	50%
Matter 3 : initiation to project engineering	45 h	1h30	1h30			2	4	50%	50%
EU discovery									
UED1(O/P)									
Subject 1 : Impact study and environmental assessments	30h	1h30	1h30			1	2	50%	50%
Matter 2 : Hygiene Safety Environment -HSE	45 h	1h30	1h30			1	3	50%	50%
Total Semester 5	375h					17	30		

6. Semester 6:

Field: Earth and Universe Sciences
Sector: Geography and Development of Territory
Specialty: Coastal Engineering and Development

Internship in a company culminating in a written report and an oral presentation

	VHS	Coefficient	Credits
Work Staff	500h	11	20
Internship in business	250h	6	10
Seminars	-	-	-
Other (to specify)	-	-	-
Total Semester	750h	17	30

7- Overall summary of The training

(Indicate the separate overall VH in courses, TD, for The 06 semesters of teaching, for The different types of UE)

EU / VH	UEF	UEM	UET	UED	PFE	Total
Course	354	384	146	112.5	/	996.5
TD	280	356	38	/	/	674
TP	78.5	45.5	/	/	/	124
Personal work	712.5	685.5	184	112.5	500	2194.5
Other (to specify)	/	/	/	/	250	250
Total	1534	1371	368	225	750	4239
Credits	73	65	11	10	30	180
% in credits for each EU	36.18%	32.34%	8.6%	10%	16.67%	100%

III – Detailed program by subject
(1 detailed sheet per subject)

SEMESTER 1

Titled of engineering : Coastal Engineering And Development		
Semester: 1		
Titled of The EU : Fundamental		
Titled of matter : Geotechnics: Soil Physics and Hydraulics		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching :
The objective of This course East The study of physical And hydraulics of The soils. He presents to students The different physical parameters of soils and The different relationships between Them, is dedicated to The classification of soils and to familiarize Themselves with flows in soils.

Knowledge prerequisites recommended :
For power pursue The teachings of this matter, The student must to have follow up The lessons taught in The preparatory classes cycle:

- Geology
- Physics
- Fluid mechanics

Content of The matter: 15h.

Chapter 1 :Introduction to geotechnics (1.5 hours *)*

1. What is The geotechnical
2. Object of The geotechnical
3. Definitions of The soils
4. Origin And training soils
5. Essential definitions
6. Disciplines of geotechnical
7. History of geotechnical
8. The areas application
9. Structure of The soils (floors grainy and fine soils).

I : Soil Physics

Chapter 2: Physical characteristics of soils *(3 hours)*

1. The phases of ground
2. The settings of nature of a ground
3. The settings of state of a ground
4. The features physical of The soils
5. Relationships between The features physical of ground
6. The clay minerals

Chapter 3 :Geotechnical classification of Soil *(3h)*

1. The features dimensional
2. The features granulometric
3. Tests identification clean to soils grainy

4. Tests identification clean to fine soils
5. Classification of The soils

Chapter 4 : Soil Compaction *(3h)*

1. Theory compaction
2. The principles of base of compaction
3. The factors influencing compaction
4. The effects of compaction on some properties of The soils
5. The tests compaction in laboratory
6. The control of compaction on site
7. The compaction in surface and in depth

II : Hydraulic of The soils

Chapter 5 :Hydraulic properties soils (4.5h *)*

1. The different shapes of presence of water In THE ground
2. The kind of tablecloths of water underground
3. Flow of water In THE soils
4. The permeability of The soils
5. Measure of coefficient of permeability At laboratory
6. Measure of permeability in situ
7. Measure of The pressure interstitial
8. Study of The flow open water
9. Study of The networks flow (2D)
10. Training of rolling sand and phenomenon of Foxes

Program of The works directed :(15h)
TD 1: Physical characteristics of soils ***(3 hours)***
TD 2 : Classification geotechnical of The soils ***(3h)***
TD 3: Soil compaction ***(3h)***
TD 4 : Properties hydraulics of The soils ***(3h)***
TD 5 : Study of The networks flow ***(3h)***

Program of The works practices (15h) :
TP 1 : Measure of The features weight (mass volumetric – content in water- density relative)
TP 2: Granulometric analysis
TP 3 : Measure of The settings of consistency (boundaries d'Atterberg)
TP 4: Measure of The features of compaction (tests Proctor)
TP 5: Constant/variable load permeability tests

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Fundamental		
Titled of The matter : Marine Geochemistry		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :
To improve the knowledge acquired by students in The first and second years in fundamental disciplines: chemistry and geology, and to provide specific concepts in order to better characterize The geochemical processes of The marine environment**.**

Knowledge prerequisites recommended: For power pursue The teachings of this unit, The student must have followed The lessons given in The classes preparatory has known : oceanography general, The chemistry of The waters natural, The marine geology, marine physics, marine biology and ecology**.**

Content of The matter (22.5h)

I. Geochemistry general :

1. Goals of geochemistry
2. Geochemical reservoirs on Earth And Their interfaces
3. Geochemistry continental

3.1. Composition of Earth's crust (continental and navy)
3.2. Classifications of The elements geochemical terrestrial.

II. Marine Chemistry :

1. Composition chemical And properties of water General sea

1.1. Cycle of water. Sources of salts has The ocean
2. Time of residence of The salts in The ocean
3. Composition chemical of water of sea (ions majors, minors And traces)
4. Temperature, salinity And density of water of sea : distributions vertical And horizontal
4. Movement of The waters; Masses of typical waters, diagrams θ/S

III. Geochemistry of The marine sediments

1. Preview on marine sediments

1.1. The sediments of The continental margins
1.2. The sediments of The abyssal plains
1.3. The sediments lake (No sailors) of different climates
1.4. Others sediments

2. The diagenesis of The sediments of The margins continental

2.1. The digenesis, his factors And his steps
2.2. The area oxidation (zone of bioturbation)
2.2.1. oxidation of The organic matter
2.2.2. Others process oxidation
2.3. The area of reduction (area without bioturbation)
2.3.1. The diagenesis suboxic reduction of The nitrates Reduction of manganese Iron reduction
2.3.2. Diagenesis anoxic Reduction of The sulfates Digenesis phosphates Methanogens

3. The diagenesis of The sediments of The abyssal plains

3.1The sediments carbonated

3.1.1. Dissolution carbonates
3.1.2. Diagenesis And burial
3.2. The sediments siliceous (opal)
3.2.1. Dissolution of silica
3.2.2. Diagenesis And transformation of The phases silicates
3.3. The diagenesis suboxic of The organic matter
3.4. Training of The nodules polymetallic

Program of The works practical

TP 1

-Levy of a sediment of surface And deep : Presentation of method sampling of marine sediment by grab and gravity corer.
-Presentation of method of cutting of carrot in samples And Their preservation in petrie dishes for analysis.
- Study of distribution vertical of The settings chemicals In The waters interstitial/sediment The long of a carrot of sediment deep by THE data has collect literature:
- Distribution of dissolved oxygen - Distribution of organic matter - Distribution of The nitrates, of The phosphates And of The silicates - Distribution of Fe, of Mn And oTher metals - Distribution of sulfur compounds and CH4 … - Determination of The boundary between The bioturbation zone (oxidation layer) and The non-bioturbation zone (reduction layer) by The appropriate parameters.

TP 2

-Features of a sediment marine : Analysis granulometric of sediment
- Features of sediment marine : Description And study of composition sediment mineralogical examination using a binocular microscope

TP 3

-Determination of concentration in matter organic by incineration Determination of The concentration of calcium carbonates by calcimetry

TP 4

Dosage of The metals traces In The sediment, notably The iron and magnesium at different depths of The sediment

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Fundamental		
Titled of The matter : Resistance Materials		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients :1**

Goals of teaching :
Learn The basic concepts of The resistance of materials, The goals and hypotheses of RDM, The concept of forces internal, geometric characteristics of The sections, The law of behavior of materials, concept of admissible stresses and The dimensioning of parts under simple stresses.

Knowledge prerequisites recommended :
For power pursue the teachings of this matter, The student must to have follow up The lessons taught in The preparatory classes cycle:

- Mechanical rational
- Analysis of The functions

Content of The matter: 15h.

Chapter 1 :Introduction to The resistance of The materials *(1.5h)*

1.1. Goals And hypotheses of The resistance of The materials
1.2. Properties materials
1.3. Convention of sign axes
1.4. Different types of loadings
1.5. Reaction support (types of connections)
1.6. Terms balance
1.7. Resolution of a issue of static
1.8. Identification of The nature of The requests

Chapter 2 :Features geometric of The shapes *(3h)*

2.1. General information
2.2. Features Cartesian
- Center of gravity
- Moment of static
- Moment quadratic
- Moment of inertia

2.3. Formulas of transformation of The moments of inertia
2.4. Moments of inertia main
2.5. Representation geometric of The moments of inertia

Chapter 3 :Traction simple And compression simple *(3h)*

3.1. Definitions
3.2. Efforts normal of traction And of compression
3.3. Constraint normal
3.4. Deformation elastic
3.5. Hooke 's Law
3.6. Module of Young
3.7. Diagram stress-strain
3.8. Condition of resistance And notion of constraint eligible

Chapter 4 :Flexion simple *(4.5h)*

4.1. Definitions And hypotheses
4.2. Efforts sharp And moments bending
4.3. Diagram of The efforts sharp And of The moments bending
4.4. Relationship between moment bending And shear force
4.5. Constraints in flexion simple
4.6. Calculation of The tangential stress
4.7. Deformed of a beam submissive has The flexion simple (notion of The arrow)

Chapter 5 : Shearing *(1.5h)*

5.1. Definitions And hypoTheses
5.2. Shear simple
5.3. Shear pure
5.4. Constraint of shear
5.5. Deformation elastic in shear
5.6. Condition of resistance At shear
5.7. Calculation of resistance in shear

Chapter 6 : Twist *(1.5h)*

6.1. Definitions And hypoTheses
6.2. Constraints And deformation
6.3. Deformation elastic in twist
6.4. Twist of The bars of section cylindrical
6.5. Twist of The bars of section rectangular
6.6. Constraint of shear in twist And constraint tangential due has The twist
6.7. Condition of resistance has The twist.
6.8. Calculation of resistance has The twist

Program of The works directed (15h.) :

TD 1 : Application on THE concepts of The resistance of The materials *(1.5h)*
TD 2 : Representation geometric of The moments of inertia *(3h)*
TD 3 : Calculated stress-strain *(1.5h)*
TD 4 : Calculation of resistance in traction simple *(1.5h)*
TD 5 : Calculation of resistance in compression simple *(1.5h)*
TD 6 : Calculation of resistance in flexion simple *(3h)*
TD 7 : Calculation of resistance in shear *(1.5h)*
TD 8: Calculation of torsional resistance *(1.5h)*

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, exposed, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Fundamental		
Titled of The matter : Marine ecology		
Volume hourly : 45 hours	**Credits : 3**	**Coefficients : 2**

Goals of teaching :
Improve The knowledge acquired by students in The 1st and 2nd years in fundamental disciplines : biology, ecology, zoology And botanical. And give the concepts specific to The marine environment.

Knowledge prerequisites recommended :
For power continue The teachings of this unit, The student must to have follow up the teachings exempted In the classes preparatory has known : oceanography general, marine biology and ecology.

Content of The matter : 22.5h

Chapter 1 : Introduction

1. Introduction
2. Factors Ecological- Factors Biotics In marine ecosystems
3. The big ones ecological subdivisions of medium marine

Chapter 2 : Pelagic ecosystems

1. The phytoplankton
   1.1. Composition taxonomic and ecological
   1.2. Adaptations of phytoplankton has The pelagic life
   1.3. Roles of The factors abiotic In The production of phytoplankton
   1.4. Case individuals : The phytoplankton toxic And the waters colorful
2. The zooplankton
   2.1. Composition taxonomic and ecological
   2.2. The adaptations of zooplankton
   2.3. The migrations of zooplankton
3. The plankton And biomonitoring
4. The Nekton
   4.1. Definition And composition
   4.2. Mobility And adaptation morphological
   4.3. Migrations
5. Impacts of The activities human on the ecosystems pelagic

Chapter 3 : Benthic ecosystems

1. Concepts of ecology navy benthic
2. The factors ecological And benthic layering
3. Originality And particularity of benthos marine
4. The benthos of substrates hard
5. The benthos of substrates furniture
6. The adaptations morphological and organic

7. Impacts anthropogenic on The habitats benthic
8. The benthos: indicator of The ecological quality

Chapter 4 : Impacts arrangements coastlines on the ecosystems coastal

1. Study of case
2. Measures of protection

Program of The works directed

1. Strategies And methods of studies applied At domain pelagic
2. Treatment of The data pelagic
3. Strategies And methods of studies applied to The domain benthic
4. Protocols of follow up of The habitats benthic : Case of The herbarium has Posidonia
5. Protocols of follow up of The habitats benthic : Case of The ecosystem coralligenous
6. Treatments of The data benthic

Program of The practical work

1. Acknowledgement of The species phytoplankton
2. Acknowledgement of The species zooplankton
3. Acknowledgement of wildlife benthic of The floors emerged : Substrate hard
4. Acknowledgement of wildlife benthic of The floors emerged : Substrate furniture
5. Acknowledgement of The Macrophytes : Algae
6. Acknowledgement of The Macrophytes: Phanerogams

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Genius Coastal And Development		
Semester : 1		
Titled of The EU : Methodology		
Titled of The matter : Treatment and Data Analysis		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :
Understand The different statistical operations and Their uses. Understand The processes that allow information to be extracted or knowledge to be produced from raw data. These processes, once programmed, are most often automated using computers. If The final results produced by These processes are intended for humans, Their presentation is often essential to appreciate Their value.

Knowledge prerequisites recommended :
To be able to continue teaching this subject, The student must have followed The teachings exempted In THE cycle of The classes preparatory (mathematics, statistics) And semester 1 (numerical analysis).

Content of The subject: (21h.)

I- Analysis of The monovariate series

1. **Descriptive statistics**
   1.1 Painting individuals / Variables
   1.2 Variables
   1.3 Paintings distributions
   1.4 Variable qualitative (Tables, Graphs)
   1.5 Variable quantitative discreet (Paintings, Graphs)
   1.6 Variable quantitative continue (Table, Graphs)
2. **Matrix**
   2.1- Introduction to matrices:
   2.2 -Properties of the matrices:
   2.3- Applications of the matrices:
   2.3.1-Systems of equations linear And resolution matrix
   2.3.2- Linear regression and least squares problems
3. **Analysis of The volatility series temporal**
   3.1 Definition
   3.2 Equation of The trend
   3.3 Line adjustment

II- Analysis bi- varied series

1. **Regression Linear simple**
   1.1 Covariance
   1.2 Line regression
   1.3 The squares of regression

III. Multidimensional analysis

1. Analysis in Main Components (ACP)

1.1 Matrices

1.2 Algorithm ACP
1.3 Projections
1.4 Inertia
1.5 Interpretation of ACP
1.6 Regression multiple

2. Analysis Factorial of Correspondences (AFC)

1.1 Paintings cross dynamic
1.2 Algorithm of AFC
1.3 Interpretation of AFC
1.4 Bi- plot

3. Hierarchical Classification CAH

1.5 Development of The method
1.6 Algorithm of The CAH
1.7 Distances
1.8 Dendrogram
1.9 Interpretation

Program of The works directed (24 h)

TD1- Calculation of The summary statistical (1.5 h)
TD2- Resolution of systems of equations linear with of The matrices (3h)
TD3- Analysis of The volatility of The series temporal :Trends, cycles And season And random variations (3h)
TD4- Analysis of linear regression (3h)
TD5- Principal Component Analysis (4.5h)
TD6- Analysis Factorial of The correspondences (4.5h)
TD7- Classification Ascending Hierarchical (4.5h)

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Methodology		
Titled of The matter : Modeling digital		
Volume hourly : 60 hours	**Credits : 5**	**Coefficients : 3**

Goals of teaching :

The aim of this course is to give students a Theoretical and practical overview of a field important part of applied mathematics. And to rigorously present The approach that allows us to numerically solve physics problems, which have in common The fact that They are modeled by partial differential equations, as well as being able to describe, understand before simulating, optimizing and controlling such complex systems of equations.

Knowledge prerequisites recommended :

To be able to continue The lessons in this unit, The student must have followed The lessons has known : Statistics, Mathematics, Computer science, Analysis digital

Content of The subject: (30h)

1 – Reminders of The concepts mathematics And of mechanics of The environments continuous

1.1. Derivatives, derivative partial And material derivative
1.2. Fields advection
1.3. General assumptions
1.4. Laws of behavior
1.5. Deformations and constraints

2- Concepts on THE equations to derivatives partial

2.1. Hyperbolic equations
2.2. Parabolic equations
2.3. Elliptic equations

3- Modeling mathematical of The phenomena transport

4.1. Equation of conservation of The mass
4.2. Equation of quantity of movement
4.3. Energy equation
4.4. Equation of conservation of chemical species
4.5. Models of Turbulence

4- Methods digital of discretization

4.1. Method of the Differences finished
4.2. Methods finished volumes
4.3. Method of The Finite elements

5- Modeling digital

5-1. Discretization And mesh
5-2. Numerical diagrams

5-3. Construction of system numerical
5-4. Boundary conditions
5-5. Display And post- processing
5-6. Convergence, consistency And stability digital

6- Digital resolution
6-1. Methods of resolution digital 6-2.
Convergence and validity tests
6-3. Programming of The solution in Matlab And in Python
6-4. Applications : Transport Equation, Diffusion Equation, Convection-Diffusion-Dissipation Equation, Wave Equation, Nonlinear Parabolic Equation, Nonlinear Hyperbolic Equation

Program of The works directed : 19.5h

TD 1 : Equations differentials ordinary ***(1.5h)***
TD 2 : Equations to derivatives partial ***(3h)***
TD 3 : Resolution of EDP by The Method of Differences Finished ***(6h)***
TD 4 : Resolution of EDP by The Method of Elements Finished ***(6h)***
TD 5 : Resolution of EDP by The Method of Volumes Finished ***(3h)***

Program of The works practices : 18h

TP 1 : Introduction to Python Programming ***(3h)***
TP 2 : The resolution mathematical of The equations to derivatives partial ***(3h)***
TP 3 : Resolution digital equations to derivatives partial ***(3h)***
- Definition of phenomenon
- Modeling mathematical
- Creation of mesh
- Terms to boundaries
- Algorithm of resolution
- Programming digital
- Visualization, exploitation of The results
- Simulation digital

TP 4: Digital resolution of EDP by The Method of Differences Finished ***(3h)***
TP 5 : Resolution digital of EDP by The Method of Elements Finished ***(3h)***
TP 6: Resolution digital of EDP by The Method of Volumes Finished ***(3h)***

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Methodology		
Titled of The matter : GIS / Mapping 1		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching :

The objective of this subject is to teach learners The fundamental concepts of GIS. After a definition of geospatial data (DG) and a reminder of spatial repositories, The student will learn The techniques of integration, structuring and analysis of geospatial data. He will also learn to produce value-added data in different forms (map, graphs, etc.). This module is a knowledge base on which The modules " GIS and Mapping: Advanced Level" and "Remote Sensing".

Knowledge prerequisites recommended :

In order to of follow teaching of this matter, The student must to have follow up THE teachings provided in The matter " Geology IV » from semester 4 of The 1st cycle of Courses Preparatory Sciences of The sea.

Content of The matter :

Part Course: 15h.

I- Data Geospatial (DG) (1h30)

- Definition
- Sources acquisition
- Models spatial (Raster, Vector)
- Components of The data geospatial (graphic parts, No chart And metadata)
- Concepts of quality and of properties

II- THE systems of reference space (1h30)

- Definition
- System Cartesian geocentric
- Systems of coordinates geographical (notions on THE ellipsoids)
- Systems of coordinates planes (notions on THE projections)
- Systems of references local And global
- Reference systems in force in Algeria
- Transformations between systems
- Concepts on vertical reference systems (orthometric and ellipsoidal altitudes) and measurement techniques (concepts on The geoid)

III- Systems Information Geographical (1h30)

- Definitions
- Features of a GIS
- GIS software
- Character multidisciplinary of The GIS
    - Drawing Assisted by Computer (DAO)
    - Computer science
    - Geodesy

    - Remote sensing
- Domains of applications (use) of The GIS
    - Management of The infrastructure public (built by The man)
    - Management of The natural resources
    - Management of The natural disasters And industrial (pre/post occurrence)
- THE geospatial data in A GIS
- Architecture general of a GIS
- Steps has follow For The design of a GIS

IV- Techniques integration of The DG (3 * 1h30)

- Techniques integration of The graphic component
    - Georeferencing
    - Digitalization
    - Restitution photogrammetric
    - Spatialization of a painting of coordinates
    - Creation of layers of parameterized data
    - Recovery of data existing
    - Surveys ground GPS (relief And bathymetry)
    - Transformation of data
- Techniques integration of The data beneficiaries (seizure direct, by mask of input, calculation, etc.)
- Structuring of The table beneficiary associate has The layer geospatial (creation, deletion, modification)
- Creation of a Joint between a layer " vector » and a table/base of data
- Creation of a base of data associate has a layer geospatial (Initiation has modeling).

V- Edition DGs (1h30)

- Definition
- Sources error
- Tools of correction of The editing errors

VI- Analysis of The data " Vector » (1h30)

- Definition
- Spatial queries
    - What is SQL?
    - The types of requests (questioning, creation, etc.)
- Geoprocessing
    - The conversion
    - The overlay (Overlay)
    - The intersection
    - The union
    - The merger (Dissolve)
    - The extraction (cutting clip, query)
    - The proximity Proximity (buffer)

- Management (copy copy, create create)
- Transformation

VII- Analysis of The data " Raster » (1h30)

- Definition
- Operations local (arithmetic, statistics, relational Or of comparison, maThematics, logic and conditional)
- Operations of neighborhood (filters, MaThematical morphology)
- Global operations
- Reclassification

VIII- Mapping (1h30)

- Introduction and historical
- Definition
- Types of maps (wide distribution) or Thematic (presentation of results or a study area)
- Components of a map (frame, title, etc.) by kind
- Bet in shape of The dressing
- Symbolic expression on a real/virtual vector (point, polygon, polyline) and a raster (color ramp)
- Variables visuals (shape, dimension, orientation, color, value, dynamic And structures)
- Properties of The visual variables

Program of The works directed : 30h

TD 1 : Presentation software (ArcGis, QGIS, etc.) and bases of data open data in line (3 h)

- Facility software
- Presentation of The environment of software
- Terms and conditions access to The bases of data in line
- Download of The data

TD 2 : Techniques integration (3 hours)

- Spatialization, georeferencing, digitalization, etc.
- Techniques of transformation

TD 3 : Edition of The vector data (3h)

- Manual techniques : Capturing nodes, removing hanging arcs, residual polygons, etc.
- Techniques automatic : Setting of The thresholds

TD 4 : Spatial queries (6h)

- Requests simple, on a table, geometric, beneficiary And topological
- Request with joint, on several tables

TD 5 : Geoprocessing (3 hours)

- Transformation

- Generation of a buffer (point, polygon, polyline)
- Intersection/Union/Merger, etc.
- Transformation

TD 6 : Analysis Spatial on of The rasters (Mapalgebra) (6h)

- Operations local (addition, multiplication, etc.)
- Operations from The neighborhood
- Global operations
- Reclassification

TD 7 : Dressing cartographic (6h)

- Realization of a map of presentation of The area of study
- Analysis Thematic

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Transversal		
Titled of The matter : Oceanographic Instrumentation		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

Instrumentation in oceanography deals with The means used in oceanography to know The properties physical of The ocean (offshore And inshore) by of The measures *in situ* . After a definition measured quantities and quantities which are deduced by calculation, this module details The operation of The sensors and instruments used to evaluate The parameters useful to oceanographers and describes The means used for measurements at sea as well as The techniques currently being developed.

Knowledge prerequisites recommended :

To be able to continue The lessons in this unit, The student must have followed The lessons exempted In THE classes preparatory has known : oceanography general and The marine physics, Thus that The module of oceanography physical of semester-1 in first second year of The second cycle.

Content of The matter :

1- Sensors And instrumentation out acoustic And optics (4h30)

1.1 Features of The sensors: Sensitivity, linearity, domain of use, extent of measure,
1.2 Sensors of measure of The: pressure, temperature, conductivity, dissolved oxygen
1.3 Measure Eulerian of current and measurement of The swell

2- Sensors And instrumentation using optics (3h00)

2.1 THE radiation electromagnetic (features of The waves electromagnetic, ...)
2.2 Absorption And broadcast of The light
2.3 Underwater optics
2.4 Properties optics of The waters of sea
2.5 Sensors optics (Fluorimetry, …)

3- THE system Argos (3h00)

3.1 THE subsystems of The system Argos
3.2 The floats oceanic : features, sensors partners, …
3.3 Float VS principle Archimedes
3.4 The cycle and The derivative of a float

4- Sensors And instrumentation using acoustics underwater (10:30)

4.1 Generality on the waves acoustics
4.1.1 Features of The waves mechanical
4.1.2 Pressure And intensity acoustic
4.1.3 The level sound, The decibel
4.1.4 Effect Doppler

4.1.5 Effect piezoelectric
4.2 Spread of The waves acoustics In THE medium marine
4.2.1 Impedance acoustic, reflectivity
4.2.2 Loss of spread waves acoustics by geometric divergences and depreciation
4.3 2.3. Main applications in oceanography physical
4.3.1 General information on THE pollsters And sonars (principle of functioning, ...)
4.3.2 The sonars lateral
4.3.3 The sonars multibeam
4.3.4 The pollsters profilers of sediments (geology acoustic)
4.3.5 ADCP (profiler of current)
4.3.6 The acoustic tomography
4.3.7 The acoustic positioning
4.3.8 Instrument used by A diver For The mapping of habitats (Aquameter)

Program of The works directed : 9 h.

TD-1 : Exercises on The characteristics sensors (calculated of The errors, sensitivity, …) (1h30)

TD-2 : Calculation of The depth, of The temperature, of The salinity, of The density has leave of The measurements given by The sensors (1h30)

TD-3 : THE lengths of waves And THE frequencies used by THE sensors optics underwater (1h30)

TD-4 : Exercises of applications on THE shift, The gone up, The descent And The speed of The Argos system floats (1h30)

TD-5 : Exercises on The spread of The waves acoustics underwater (1h30)

TD-6 : Treatment of The data issues of measures acoustics (1h30)

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 1		
Titled of The EU : Discovery		
Titled of The matter : Scientific English 1		
Volume hourly : 30 hours	**Credits : 1**	**Coefficients : 1**

Goals of teaching :

During semester 2, the student must acquire The basic notions of The English language, expressing himself on dimensions and quantities to describe The different objects according to height, width, and surface or weight, volume, and rate. These concepts will be supplemented by a series of exercises to put The application of The rules into practice. which govern The interrogative form, in this case The structuring of questions and answers in English, while respecting The tense (Present simple, present perfect or Past).

Knowledge prerequisites recommended :

For power pursue the teachings of this unit, The student must to have followed English lessons provided in preparatory classes

Content of The matter :

Unit 1 : Describing The dimensions of an object :
- Height, Width, Weight, depth, missed ……
- Exercises
- Lexicon
- Assessment

Unit 2 : Speaking about quantity
- Countable nouns : a/an, tea, many, few, a few
- Uncountable nouns: much, little, a little
- Exercises : How much …. ? How many…… ? How far…. ?
- Video : How to talk about measurements ?
- Lexicon
- Assessment

Unit 3 : To say how often something does happen ?
- Usually, often, rarely, sometimes, ounce , twice…..
- Review of Present Simple tense.
- Exercises
- Lexicon
- Assessment

Unit 4 : Asking questions in Present Simple tense
- How does …… ?
- Is it .....?
- Exercises
- Lexicon
- Assessment

Assessment method:
- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

SEMESTER 2

Titled of engineering : Coastal Engineering And Development		
Semester : 2		
Titled of The EU : Fundamental		
Titled of The matter : Dynamic oceanography		
Volume hourly : 40 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :
This course has For objective to teach to students the main foundations of physical oceanography ; description of The dynamic And the functioning of The ocean Thus that The study of complex role it plays in The climate system and marine weather forecasting.

Knowledge prerequisites recommended :
To be able to continue the courses in this unit, the student must have followed the courses provided in the preparatory classes, namely: general oceanography and marine physics.

Content of The matter : 28h30

Chapter 1 : Introduction has The physical of The atmosphere (9:00)

1. Stratification vertical in pressure And temperature (3h00)

1.1. Stratification And composition of the atmosphere
1.2. Thermodynamics of dry air
1.3. Law hydrostatic And stratification
1.4. Distribution vertical and meridian of The temperature on earth

2. THE transformations of a plot of air In The atmosphere (3h00)

2.1. THE transformations **without** change of phase : liquid- vapor
2.1.1. Transfer adiabatic
2.1.2. The temperature potential
2.1.3. Ancestry And subsidences adiabatic
2.2. THE transformations **with** change of phase : liquid- vapor
2.2.1. Process evaporation And of condensation atmospheric

3. Humidity atmospheric (1h30)

3.1. The partial pressure of the water vapor
3.1.1. Tension of steam (law of The gas perfect)
3.1.2. The you of Delton
3.2. Humidity specific
3.3. The report of mixture
3.4. Humidity relative
3.5. The temperature of point of dew

4. The Emagram (1h30)

Chapter 2: Dynamic oceanic (19h30)

1. Equations of base in oceanographic physics (3h)

1.1. The equation of continuity (conservation of The mass)
1.2. The equations of movement in oceanographic (2nd law of Newton, Scaling, …)

2. Currents without friction, fluent geostrophic (3h)

2.1. The balance hydrostatic
2.2. The fluent of inertia
2.3. The geopotential
2.4. The speed of fluent geostrophic

3. Currents frictional (4h30)

3.1. The equations of movement including the forces of friction
3.2. The solution of Ekman (traffic induced by the wind)
3.3. The transportation of Ekman In The layer superficial
3.4. The upwellings and downwellings far of The borders (convergences and divergences)
3.5. Friction in water little deep
3.6. Limitation of The Theory of Ekman
3.7. Solution of Sverdrup (induced circulation by The wind)
3.8. Transportation mass total (transportation below of The surface layer)
3.9. Solutions of Stommel and from Munk

4. Vorticity (1h30)

4.1. The vorticity relative: ζ
4.2. The vorticity planetary : f
4.3. The vorticity absolute: (ζ + f)
4.4. Th vorticity potential : (ζ + f) / D

5. The traffic Thermohaline (3h00)

5.1. The deep circulation
5.2. The equations of T and S, laws of conservation of The heat And salt

6. The dynamic of The waves linear (4h30)

6.1. The waves internal I (waves has The interface of a ocean to two layers)
6.2. The waves internal II (effect of rotation)
6.1.1. Waves of Poincaré (inertia / gravity)
6.1.2. Waves of Kelvin (borders lateral vertical)
6.1.3. Waves planetary Or waves of Rossby (variation of setting of Coriolis, β- effect)
6.1.4. Waves topographical of Rossby

Program of The works directed :
TD-1 : The equation of balance hydrostatic In The atmosphere (1h30)
TD-2: The hypsometric equation (height scale) (1h30)
TD-3 : Emagram : diagram meteorological allowing of represent A survey (1h30)

TD-4 : Demonstration of The equation of continuity (1h30)
TD-5 : THE equations of movement in oceanography : establish the equations (1h30)
TD-6: Frictionless currents (1h30)
TD-7 : Fluent geostrophic (1h30)
TD-8: Frictional currents (1h30)
TD-9: Vorticity (1h30)
TD-10 : The traffic Thermohaline (1h30)
TD-11 : The dynamic waves linear (1h30)

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Genius Coastal And Development		
Semester : 2		
Titled of The EU : Fundamental		
Titled of The matter : Coastlines and societies : evolution, development		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching :

This course has For aim of to arouse in The student The relative questioning to challenges eco geographical And anthropogenic of space coastal And of introduce it to The procedures cross-sectional aspects of its management and sustainability. It is structured around The characterization of socio-economic changes
spatial, of The questions And of The methods aiming The assessment of The state of The areas coastal And a better approach to Their sustainable development.

Knowledge prerequisites recommended :

to be able to continue teaching this subject, The student must have followed The courses provided in The preparatory classes cycle (physical oceanography), The semester 1 (physical navy) And the Semester 2 (dynamics oceanic), Coastal and underwater geomorphology I, Coastal and coastal hydrodynamics

Content of The matter : 30h

I. Acceptance And delimitation of coastline

- The medium coastline And his challenges
- Partition of The coast
- The geo system coastline

II. Coastline And pressures anthropogenic

- Reasons historical of The occupation of coastline
- Factors natural
- Factors socio- economic
- Activities And actors of The coast
- impacts of The human activities : pollution, erosion, on exploitation
- Occupation of The areas coastal : modes occupation, competition, conflict of use, ...

III. Systemic analysis

- Definition And construction systemic
- The matrix structural analysis
- The ranking of The variables (THE variables keys)

IV. Diagnosticspatio environmental

- indicators of coastal vulnerability
- principle
- indicators of physical vulnerability
- indicators of socioeconomic vulnerability
- indicators of institutional vulnerability

- critical

Program of The works directed: 15h.

1. THE plans development coastal (PAC) has The scale Mediterranean (Evolution And perspectives)
2. Instruments development in Algeria : analysis And comments (With external speakers)
   - 1. The Plan National of Development of Territory : SNAT
   - 2. The Plan Director of Development of The Coast : SDAL
   - 3. The Scheme Director of The area metropolitan Algerian (SDAM – Algiers)
   - 4. The plan development of The bay from Algiers (plan strategic 2009 - 2029)

3. Study of exploitation And of The protection of dune cordon (Terga. W Ain Timouchent)
4. Evolution And protection of The dune border of The (Kaddous or Boumerdes West)
5. Study And comments of The provisions of The 'law coastline' concerning The protection of The beaches And dunes
6. Evolution, problems And perspectives of a cliff in area urban : Boumerdes- West Or Ain Taya
7. Impacts anthropogenic on evolution of a delta zone
8. Impacts anthropogenic on evolution of lake mellah And perspectives of protection
9. Application IVC (indicator of coastal vulnerability)

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Genius Coastal And Development		
Semester : 2		
Titled of The EU : Fundamental		
Titled of The matter : Geotechnics: soil mechanics		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

The objective of this education East of allow has The student of complete the knowledge acquired in geotechnics 1 in S1, and to study soil mechanics for projects construction in sea and on the coastline. The student will receive education on the calculation of The constraints in soils and The calculation of settlements and soil consolidation. He will also receive knowledge on the behavior of soils under shear as well as on earth thrusts and stops.

Knowledge prerequisites recommended :

For power pursue the teachings of this matter, The student East called has know : Geotechnics 1, resistance of materials and physics.

Content of The matter : 24h

Chapter 1 :Distribution of constraints In the soils *(4.5h)*

1. Introduction
2. Notion of constraints in A point
3. Circle of Mohr For the constraints in A point
4. Constraints due At weight lands
5. Principle of The constraints effective of Terzaghi
6. Constraints due to flow forces
7. Theory from Boussinesq (Charge punctual and distributed),
8. Constraints due to overloads of The work

Chapter 2 :Settling of floors *(1.5h)*

1. The deformation of The soils
2. Evolution of The settlement in The time
3. Compressibility of The soils
4. The assessment of settlement of The soils has leave of tests At laboratory
5. Classification of The floors facing each other of The compressibility
6. Calculation of The settlements - Method of layers

Chapter 3: Consolidation of soils ends *(3h)*

1. Definition of The consolidation primary from The ground
2. Theory of The Terzaghi consolidation
3. Degree of consolidation
4. Duration of The settlements
5. Determination of coefficient consolidation
6. Consolidation of a ground compound of several layers
7. Reduction of time of consolidation
8. Secondary consolidation

Chapter 4 : Resistance At shear of The floors *(3h)*

1. Concepts elementary on The breakup of The soils
2. Constraints on a plan shear
3. Criteria of breakup from The ground
4. Theorem of The states correspondents of Caquot &Kérisel
5. Different types of behavior of ground.
6. Measure characteristics mechanical
7. Resistance to shear soils unsaturated
8. Study of The mechanical characteristics

Chapter 5 :Push and stop lands (*3h)*

1. Relationship between pressures lateral and travel
2. States balance limit
3. Push of The lands at rest
4. Determination of The plans of break at help of The circle of Mohr
5. Coefficients of thrust and stop
6. Calculation of The forces of thrust And of stop (Coulomb , Rankine, …)
7. Push due to surcharges
8. Comparison of The different methods

Program of The works directed :15h.
TD 1: Constraints in soils ***(4.5 hours)***
TD 2: Soil compaction ***(1.5 hours)***
TD 3 : Consolidation of fine soils ***(3h)***
TD 4 : Resistance At shear of The soils ***(3h)***
TD 5 : Push And stop of The lands ***(3h)***

Program of The works practices : 6h
TP 1: Test of edometer compressibility
TP 2: Test of direct shear (box of shear - box of Casagrand)

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 2		
Titled of The EU : Methodology		
Titled of The matter : Programming		
Volume hourly : 35 hours	**Credits : 2**	**Coefficients : 2**

Goals of teaching :

The objective of this course is to master The basics of The Python and Matlab programming languages to analyze, visualize and model data. The course of this subject offers in 35 hours (15 hours of lectures, 20 hours of tutorials) two parts: The first is dedicated to Python and The second is dedicated to Matlab.

Knowledge prerequisites recommended :

For power pursue THE teachings of this matter, The student East called has known : Algorithms, programming and numerical calculation.

Content of The matter 15h

1st Part / Python:

1- Introduction And features main of Python
2- The variables And tests
3- Connection and curls
4- Main types of data
5- Tuples in Python
6- Structures conditional And iterative
7- Dictionaries in Python
8- THE functions in Python
9- Modules And imports
10- Programming

2nd Part / Matlab :

1- Introduction And features main from Matlab
2- The variables And tests
3- Vectors and Matrices
4- The loops
5- The functions
6- Management of The data
7- Structures conditional And iterative
8- Graphical representation
9- Programming

Program of The works practices :20h

TD1: Access to Python
TD2 : Seizures of data
TD 3 : Structures conditionals TD
4: Functions
TD 5: Programming
TD 6: Modules and Files
TD 7: Imports / Exports of data

2nd Part / Matlab :

TD1 : Access to Matlab
TD2 : Variables and matrices
TD3 : Loops, Tests And Functions of TD4
base Graphics and Files
TD5 : Programming structured TD
6: Graphics
TD7 : Integration digital - Sensitivity has The discretization

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, tutorials, tests oral, homework, presentations, internship reports)

Titled of engineering : Genius Coastal And Development		
Semester : 2		
Titled of The EU : Methodology		
Titled of The matter : Fluid dynamics		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :
The Fluid Dynamics course offers in 45 hours (22.5 hours of lectures, 22.5 hours of tutorials) a rigorous and applied approach to fluid dynamics, fluid Thermodynamics and an introduction to unstable fluid flows and turbulence.

Knowledge prerequisites recommended :
To be able to continue teaching this subject, The student is required to know: oceanography, mechanical of The fluids. Static of The fluids And dynamic of The fluids perfect

Content of The matter : 22.5h.

|1- Physical, Kinematic And dynamic fluids

- Description macroscopic,
- Tensor deformation And tensor of The constraints,
- Equation of continuity, law(s) of behavior,
- Equations of movement in flow compressible,
- Equations of conservation of tracers.

|2- Thermodynamics of The fluids

- Equation of state,
- 1st and 2nd principles of The Thermodynamics

|3- Flows of real fluids

- Analysis dimensional and notion of similarity.
- Flow of layer limit (equations of Prandtl, application has The layer limit de Blasius).
- Main classes of hypotheses For the fluid models (Boussinesq...),
- Strength exercised by a fluid viscous on a solid has small and large number of Reynolds.

|4- Dynamic of The fluids in rotation

- Fluid model in a rotating medium,
- Dimensionless characteristic number,
- Geostrophic flow,
- Taylor-Proudman columns,
- Thermal wind.

|5- Waves In the fluids

- Concept of flow disturbance,
- Equations verified by infinitesimal amplitude disturbances.
- Acoustic waves.
- Capillary and gravity surface waves.
- Internal waves

6- Whirlwind and vorticity

- Evolution of The vorticity
- Theorems of Kelvin, of Taylor-Proudman And of Ertel.

7- Flows unstable

- Dissipation, notions of stability
- Analysis of linear stability
- Instabilities Thermodynamics (instability convective...)
- Mechanical instabilities (perfect fluid paradox, barotropic instability, baroclinic instability, Kelvin-Helmholtz instability, etc.).

8- Turbulence

- Turbulent transition of open flows (plane Poiseuille flow, layers limits, intermittence...),
- Developed turbulence: dissipation rate, dissipation paradox at high Reynolds number, Richardson-Kolmogorov cascade, Kolmogorov Theory, intermittency, turbulence and vorticity in 2D and 3D.

Program of The works directed :22.5h

1- Kinematic of The fluids
2- Thermodynamics fluids
3- Dynamic of The fluids real
4- Dynamic fluids in rotation
5- Waves In the fluids
6- Whirlwind and vorticity
7- Flows unstable
8- Flows turbulent

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 2		
Titled of The EU : Methodology		
Titled of The matter : Concrete in maritime site		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :
Teach The physical and mechanical characteristics of reinforced concrete. Learn The sizing of The sections submitted has of The requests simple (traction, compression And simple bending) according to The BAEL, CBA93 rules. It also provides general notions on prestressed concrete technology, as well as The uses of concrete in maritime sites.

Knowledge prerequisites recommended :
For power continue The teachings of this matter, The student East called has known :

- Resistance materials

Content of The matter : 30h

Chapter 1 :Formulation And properties of concrete armed *(6h)*

1. Definition of concrete
2. Historical of concrete
3. THE types of concrete
4. Constituents of reinforced concrete
5. Cements
6. Aggregates
   – Granularity
   – Classification of The aggregates
   – Characteristics of The aggregates
   – Different types of aggregates
7. The binders
8. Adjuvants
9. Classification of The steels For concrete armed
10. Bet in artwork of concrete

Chapter 2: Concrete armed *(9 h)*

1. Actions
2. Combinations
3. States Boundaries
4. Condition of non- fragility
5. Adhesion and anchoring
6. Simple compression
7. Traction simple
8. Flexion simple

Chapter 3 :Concrete prestressed *(9 h)*

1. Historical
2. Modes of prestressing
3. Domain application
4. Features materials
5. THE frames passive And active
6. Actions, Combinations And States Boundaries
7. Losses prestressing

Chapter 4 :Concrete in maritime site *(6h)*

1. Actions on the works maritime
2. THE assaults on concrete
3. The choice of The material concrete on site maritime
4. Concrete in site maritime, requirements And specifications
5. Concrete prestressed in maritime site
6. The prestressing used in repair
7. Control of quality
8. Monitoring And Follow up of The sustainability of concrete

Program of The works directed :
TD 1 : Behavior of concrete ***(1.5h)***
TD 2 : Calculation of reinforced concrete ***(6h)***
TD 3 : Calculation of prestressed concrete ***(4.5h)***
TD 4 : Calculation of concrete in maritime sites ***(3h)***

Program of The works practices :
TP 1: Densities cement, sand And gravel ***(1.5h)***
TP 2: Analysis granulometric of sand And gravel (*Determination of The module of finesse*) ***(2h)***
TP 3 : Water content And proliferation of sand ***(2h)***
TP 4: Sand equivalent ***(2h)***
TP 5: Test of consistency and taking cement ***(2.5h)***

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 2		
Titled of The EU : Methodology		
Titled of The matter : Watershed Hydrology		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

The subject of watershed hydrology concerns The study of The mechanisms of water flows in natural systems (watersheds), These flows (liquid and solid flows) are useful for The sizing of hydraulic structures (exploitation and management of water), and Their impacts on The coastal hydrodynamic process, also it allows to better understand and simulate The dynamic behavior of water.

This matter aims to lay The foundations of engineering hydrology knowledge. In particular, watershed hydrology, The study of precipitation, flow rates and Their measurements and estimations.

Knowledge prerequisites recommended :

A Good mastery of The sciences of base East essential in particular the mathematics And statistics. Basics of numerical calculation (Excel).

Content of The matter :

Chapter 1: General information (1h30)

1. Definitions :
2. Hydrology And cycle of water (cycle hydrological)
3. Domains application
4. Watershed
5. Flood
6. Flooding
7. Delimitation of The Watershed (different methods of delimitation)

Chapter 2 : Descriptors geomorphological Watershed (6 h).

1. Gravilius compactness index
2. Equivalent rectangle
3. Global slope index
4. Hypsometric curve
5. Elevation difference
6. Hydrographic network

Chapter 3: rainfall (6h)

1. Precipitation average annual
2. Rain daily maximum
3. Rain daily maximum frequency
4. Rain of short duration
5. Intensity of The rains

6. Deficit
7. Hydrological balance

Chapter 4: Hydrometry (3h)

1. Liquid flow rates
2. Solid flows
3. Contributions

Chapter 5: Initiation At Hec Ras software (6h)

1. Determination of The lines of water (Hn and Hcr For the different regime flow) with The Hec Ras software
2. Integration of The hydraulic works: dams, culverts, etc.

Program of The works directed: 24 hours

TP 1 : Delimitation of The watershed (different methods of delimitation) And calculation geomorphological descriptors of watersheds. (9 h.)
TP 2: Rainfall. (6h)
TP 3: Hydrometry (3h)
TP 4 : Initiation At software Hec Ras. (6h)

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 2		
Titled of The EU :Transversal		
Titled of The matter : Climatology and climate change		
Volume hourly : 25 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

This teaching aims to knowledge of The climate system and its functioning as well as The awareness of The features of The main gas has effect of tight. Introduction has The Climate modeling, scenarios, and model predictions. Analysis of The impacts of climate change on The physical and human environment. Adaptation measures considered to mitigate climate change specific to coastal areas.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have completed The 1st year General Geology and 2nd year Marine Physics courses taught in The preparatory classes as well as The oceanography course in semester 1 of The specialty.

Content of The matter :

1. Notions of Climatology **(5.50h)**
    - Definition And aim of Climatology
    - The different types of climates
    - The settings climatic
    - Structure And composition current of The atmosphere
    - Role of The atmosphere
    - Causes of The variations of The temperature of The earth
        - Factors astronomical (activity solar…)
        - Factors geological (activity volcanic…)
        - Factors oceanic (Phenomenon The NiNO...)
        - Factors atmospheric (Role of Greenhouse Gases…)
        - Albedo planetary
    - The events climatic extremes (storms, cyclones)

2. The changes climatic At course of The time geological **(6h)**
    - The origin of The cycles glacial -interglacial
        - The position of The continents (control tectonic)
        - The variations of rate of dioxide of carbon
        - The variations in insolation
    - The variations of level of The sea
        - Level marine absolute And relative
        - The causes of The variation of level marine
        - Study paleoshorelines
        - Variations global of The oceans during of The time geological

3. The change climate current **(8h)**
    - The greenhouse effect phenomenon

- The warming planetary and the change climate
- The role activities human In the warming current climate .
- Impacts of climate change on the physical environment
- Impacts of warming climate on The companies human
- The evolution recent of level marine
- Flood temporary and events climatic extremes
- The forecasts of The models climatic (GIEC)

4. The importance of mitigation of change climate **(1h30)**
5. The adaptation to effects of change climate (The elevation of level of The sea) **(1h30)**

Program of The works directed :
Realization And presentation of presentations Themes having line to changes climatic.

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Genius Coastal And Development		
Semester : 2		
Titled of The EU : Transversal		
Titled of The matter : Research methodology		
Volume hourly : 15 hours	**Credits : 2**	**Coefficients : 1**
Teaching objectives: The objective of this module is to teach The student The principles and rules of The scientific approach. To teach him how to effectively conduct documentary research work in a university setting by knowing The resources of The common documentation service, synThesizing documents, writing a final year dissertation according to ISO standards, and mastering oral presentation skills to present his presentation.		
Knowledge prerequisites recommended :		
Content of The matter : 15h. **I. Research And exploitation of scientific documents** **1. Process of research :** - Define his needs - To research The documents - Assess the documents - Do of The day before **2. The synthesis of documents scientists:** - How synThesize the documents scientists ? - Writing of a form of reading. **3. The communication written In The research (Production scientist And technical) :** - Presentation of The different documents scientists (article, publication, memory, reports, etc.) ; - Parts constitutive of The different types of documents ; - Writing of a memory according to The standard iso; - Writing of The references bibliographical of all types of documents ; **II. The communication oral In The scientific research** - Rules of communication oral (preparation, message, support, posture, debate And answer to questions); - Realization of a presentation (Posters, PPT, …).		
Program of The works directed :		
<u>Assessment method:</u> • Exam of end of semester • Controls continuous : (tests in sessions of course, tests oral, homework, exposed)		

Titled of engineering : Coastal Engineering And Development		
Semester : 2		
Titled of The EU : Discovery		
Titled of The matter: Scientific English 2		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

The student must know how to compare between two entities using comparison structures. To understand scientific terminology, knowledge of The laws of affixation is necessary to dissect technical terms.

The S3 program provides for The explanation of graphs and The reading of The numbers They contain statistics. These concepts will be supplemented by a series of exercises to verify The acquisition of skills

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have completed The 1st and 2nd year English language courses provided in The preparatory classes as well as The 1st specialty year.

Content of The matter :

Unit 1 : Comparison

- Comparative adjectives : ……is bigger than……
- Superlative Adjectives : Tea biggest, tea best, ……
- Similarity : …..as big as ……..
- Exercises
- Lexicon
- Assessment

Unit 2 : Modification

- Pre-modification : Determiners, adjectives
- Postmodification : Relative clauses introduced by Who, which, that…….
- Exercises
- Lexicon

Unit 3 : Scientific affixation (Prefixes and suffixes)

- Suffixes
- Prefixes
- Exercises
- lexicon

Evaluation

Unit 4 : Figures, charts, graphs

- Reading figures
- Explaining Graphs and charts
- Exercises
- lexicon

Evaluation

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course)

SEMESTER 3

Titled of engineering : Genius Coastal And Development		
Semester : 3		
Titled of The EU : Fundamental		
Titled of The matter : Coastal engineering		
Volume hourly : 60 hours	**Credits : 4**	**Coefficients : 3**

Teaching objectives: This subject aims to prepare students wishing to work in The field of port engineering, development and coastal zone defense. The development of ports, commercial, fishing or recreational, requires The training of engineering-level professionals capable of designing port facilities or coastal protection structures with a concern for environmental impact in The sustainable development framework. The training is thus focused on acquiring knowledge in The areas of coastal zone planning and protection, port structures, coastal defense works as well as environmental impact forecasting for The installation of such structures.

Recommended prior knowledge: to be able to continue teaching this subject, The student must have followed The lessons taught in The cycle preparatory classes (physical oceanography), semester 1 (marine physics) and semester 2 (ocean dynamics), Coastal and underwater geomorphology I, Coastal and coastal hydrodynamics and geotechnics.

Content of The matter : 35 h

I. Introduction At genius port

- I.1. Introduction
- I.2. Definition of port
- I.3. Allocated missions
- I.4. Features
- I.5. The types of ports
- I.6. Infrastructure And facilities of a port site
  - I.6.1. The channel maritime
  - I.6.2. The lock
  - I.6.3. The dikes
  - I.6.4. The reservoirs
  - I.6.5. Docks And deposits
  - I.6.6. Basin dry dock
  - I.6.7. Construction And construction site naval
  - I.6.8. Wharf of The ships
  - I.6.9. Duke from Alba
  - I.6.10. Pier
- I.7. Ground plan design
  - I.7.1. Physical conditions

I.7.2. Nautical conditions
I.7.3. Economic conditions
I.7.4. Terms relatives to maintenance from The depths
I.7.5. Case individuals
II. Characterization of site And collection of The data
II.1. Bathymetry and morphology
II.1.1. General information
II.1.2. Interaction between The morphology And bathymetry
II.1.3. Bathymetry And morphology related to The works maritime
II.1.4. Dunes submarines
II.1.5. Coastlines muddy: mudflats And salt meadows
II.1.6. Beaches
II.1.7. Coastal dunes
II.1.8. Cliffs And platforms coastal
II.2. Terms to boundaries hydraulics
II.2.1. Introduction
II.2.2. Diet of The winds
II.2.3. Use data of atmospheric pressure
II.2.4. Levels of water in marine environment
II.2.5. Ocean currents
II.2.6. Shit wind and swell oceanic
II.3. Geotechnical surveys And collection of The data
II.3.1. Goals of The recognitions geotechnical
II.3.2. Procedures has follow For THE geotechnical reconnaissance
II.3.3. Elements keys geotechnical surveys
III. Exploitation of The careers And works maritime
III.1. Introduction
III.2. Considerations for The design
III.3. Ladder of The project
III.4. Planning
III.5. Size maximum rockfill
III.6. Sources rockfill And purchase options
III.7. Considerations general
III.8. Project cost
III.9. Main functions And properties of The rockfill
III.9.1. Functions of The rockfill In The work

III.9.2. Properties rockfill

III.10. Rockfill natural

III.10.1. Introduction

III.10.2. Principles of The assessment of The career

III.10.3. Properties and functions – general information

III.10.4. Properties intrinsic

III.10.5. Properties induced by production

III.10.6. Properties induced by construction

III.11. Rockfill artificial

III.11.1. Introduction

III.11.2. artificial blocks

III.11.3. Properties

III.11.4. Blocks commonly used

III.11.5. Manufacturing And laid

III.11.6. Formwork

III.11.7. Casting of The artificial blocks

III.12. Recycled materials And secondary

III.12.1. Introduction

III.12.2. GABIONS

III.12.3. Geotextiles and geosystems

IV. THE works of protection of coastline

IV.1. The design of The work

IV.1.1. Choice of type of work

IV.1.2. Constraints techniques

IV.1.3. Constraints environmental

IV.1.4. Constraints efficiency

IV.2. Dike has embankment

IV.2.1. Elements constituents And sizing

IV.3. Vertical dikes

IV.3.1. Constituent elements

IV.3.2. Choice of methods of calculation

IV.3.3. Sizing of The base

IV.3.4. Protection of The foundation of The work

IV.4. Classification of The works

IV.4.1. Number of stability

IV.5. Types of The works of protections

IV.5.1. Coating

IV.5.2. Protection anti -scour

IV.5.3. Ear

IV.5.4. Breakwater

IV.5.5. Ear in Y

IV.5.6. Ear in L and in T

IV.5.7. Threshold Or dike submerged

IV.6. Determination of The side of leveling

IV.6.1. Calculation of The rise of The wave :

V. THE beaches artificial

V.1. Introduction

V.2. Classification of The artificial beaches

V.3. Profiles of The beaches artificial

V.3.1. Beaches without work of foot

V.3.2. Beaches has stop of foot

V.3.3. Beaches suspended

V.3.4. Beaches protected by A breakwater continuous

V.3.5. Beaches protected by A breakwater discontinu

V.4. Traces in plan of The artificial beaches

V.5. Sizing of The artificial beaches

V.6. Recharging beaches

V.7. Criteria planning

V.7.1. Overfill Factor

V.7.2. Renourishment Factor

V.7.3. Overfill Factor/Renourishment Factor

VI. THE bypass sedimentary

VI.1. Importance of recovery of transit coastline

VI.2. Different shapes of bypass VII.
Offshore infrastructure

VII.1. Operations offshore And development structural VII.2.
Components of a typical offshore structure

VII.3. Materials And Their behavior In The environment oceanic

VII.4. Forces environmental on THE offshore structures

VII.5. Considerations fundamentals For The analysis of The structures offshore

Program of The works directed : 25 hours

1. Design of a plan of mass of a seaport
2. Bathymetry And morphology of The sites of implantation of The ports And of defense ribs

3. study comparative between the rockfill natural And artificial
4. Dimensions in plan of The works of protection parallel to The side
5. Dimensions in plan works of protection perpendicular has The side
6. Sizing beaches artificial
7. Note of calculation of The Offshore infrastructure .

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, tutorials, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 3		
Titled of The EU : Fundamental		
Titled of The matter : Coastal and underwater geomorphology		
Volume hourly : 60 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching: This education has For aim to introduce the knowledge In the domain of The different shapes that we can observe on the coastline, Thus that on the funds sailors. These morphologies are essentially linked to The geodynamics of The basin, to marine hydrodynamics, to The geological nature of The terrain, to human presence and to The existence of marine flora and fauna. The student must to understand so These links.

Knowledge prerequisites recommended :
To be able to continue teaching this subject, The student must have followed The teaching provided in The preparatory classes, namely: 1st year general geology and geology Navy of 2nd year Thus that the teachings of specialty of The semesters 1 and 2 has knowledge: Seabed Geology and Watershed Hydrology.

Content of The matter : 39h

1- Contribution of geomorphology For knowledge of medium physical. **(3h)**

- Definition of The Geomorphology And its objectives
- The different branches of The Geomorphology
    - Structural geomorphology
    - Dynamic geomorphology

2- Impact of watershed on the coastline **(3h)**

- Network hydrographic And factors of control flow rates liquids And solids
- Impact of The flow rates liquids And solids (estuaries And deltas)
- Impacts of The activity human on The stream of a basin

3- The Domain marine **(13h)**

- Geodynamics of the seabed **(3h)**
- Morphology of marine domain **(3 hours)**
- Characteristics of seawater **(2h)**
    - Chemical composition
    - Temperature
    - Hydrodynamics (the waves, the tides, the big currents oceanic)
- The sedimentation underwater **(2h)**
- Eustatism (marine transgressions and regressions) **(3h)**

4- The coastal environments **(20h.)**

- Definition of coastline **(3h)**
- Definition of The Geomorphology coastal
- The nature of coastal sedimentation

- Agents and processes of coastal evolution **(6h)**
  - The waves
  - Coastal currents caused by waves
  - Tides and tidal currents
  - The wind
  - The runoff water and infiltration (rainwater)
  - Chemical and physico-chemical actions
  - Biological actions
- Cliffs: geomorphology of rocky coasts ***(3h)***
  - Definition And types of cliffs (cliffs lively, cliffs dead, false cliffs)
  - Formation of cliffs
  - Role of The nature of the rocks in the morphology of the cliffs.
  - Role of the relative contribution of sea action and subaerial action in the morphology of cliffs
  - Morphologies linked to the evolution of cliffs over time
- The beaches **(3h)**
  - Definition And types of beaches
  - The origin of The sediments of The beach
  - The morphology of The beaches
  - Induration of The sediments of The beach (beachrocks)
  - The variations seasonal of profile of The beaches
  - Morphology coastal due to The waves extremes
- The dunes coastal **(3h)**
  - Definition And terms of training dunes
  - The role of The vegetation in The training and dune stabilization
  - The different types of dunes (The dunes of first line And fields of dunes)
  - The structures internal of The dunes
  - Dunes old And recent dunes
  - The importance of dunes in reconstructing the relative mean water level and climate of the past
- Impact of coastal development on coastal morphology **(2h)**

Program of The works directed: 21h.

TP1 : Reading of maps bathymetric **(3h)**

TP2 : Reading of geological maps of The areas coastal **(3h)**

TP3 : Mapping sedimentary (on computer) **(3h)**

TP 4 : Analysis carbonates And heavy metals **(3h)**

Field trips: **(21h.)**

- Acknowledgement of The different geological facies which outcrop on the coast (outcrop of the basement metamorphic and the rocks plutonic associated, outcrop of rocks acidic and basic volcanic rocks, outcrop of sedimentary rocks).
- Recognition of The different morphologies encountered on the coast (dunes, sharp cliffs, dead cliffs, abrasion platforms, etc.)
- Analysis of The speed of retreat of rock cliffs (marine erosion) as a function of the geological nature of the substratum.
- Production of cartographic surveys of The different lithological facies (natures of rocks) as well as tectonic and sedimentary structures (faults, unconformities, etc.).

Geological cross-sections in the field showing the stratigraphic relationships between outcropping rocks and tectonic structures (faults) in a stretch of coastline
Assessment method: • Exam of end of semester • Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 3		
Titled of The EU : Fundamental		
Titled of The matter : Coastal development		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching: He exists a diversity of environments, Who compose the heritage natural coastal. These environments can be strongly affected by the facilities And the actions human which disrupt Their natural dynamics.
The aim of this teaching is to understand Their evolution and to approach Them, at different scales of space and time, under The effect of natural and especially anthropogenic factors. The impacts of facilities And the principles of management And of protection will be examined For THE coastal sandy and rocky areas, river mouths and coastal water bodies.
The knowledge acquired will enable critical analysis of protection methods and reflection on the principles and methods of sustainable management of the coastline

Recommended prior knowledge: to be able to continue teaching this subject, The student must to have follow up the teachings exempted In the cycle of The classes preparatory (physical oceanography), Coastal and underwater geomorphology I, Coastal and coastal hydrodynamics

Content of The matter :30h

I. The sandy coast

1. The beaches

- Analysis eco -societal
- Approach systemic
- Fragility natural current
- Impacts anthropogenic
- Development and protection principles

2. The dunes coastal

- Role And value of The environments dunes
- Reminders on The shape and The training
- Impacts anthropogenic
- Principles development And of protection

II. The coastal rocky (cliffs marines)

- Characterization of The ribs to cliffs
- Impacts anthropogenic on evolution of The cliffs
- Principles development And of protection
- Approach systemic (environmental)

III. The coastal humid

1. The areas of delta

- Nature And terms of training of The deltas
- Characters morphological
- Impacts of The facilities on evolution of The deltas

- Principles of valuation And of protection

2. The estuaries

- Terms of existence of a estuary
- Dynamic And score of The area estuary
- Impacts of The facilities on evolution of The estuaries
- Principles of valuation And of protection

3. THE coastal lagoons

- Definition And morphology kind
- Partition of The area lagoon
- Impacts anthropogenic on evolution lagoons
- Development and protection of The spaces lagoon

4. THE marsh maritime

- Definition And conditions of evolution
- Zoning kind of a maritime marsh
- Impacts of The activities human
- The management sustainable of The areas of marsh

Program of The works directed :15h.

1. Concepts of province And cell sedimentary : study of case
2. Comment And analysis of The coupling space – time of system hydro -sedimentary
3. impact of The evolution of The stroke of coast on The populations
4. Degradation of The dunes coastal by urbanization
5. Degradation of The lands agricultural leaning against has The coastal fringe
6. Food of The beaches : exercise application

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Genius Coastal And Development		
Semester : 3		
Titled of The EU : Methodology		
Titled of The matter : Marine hydrodynamics		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching : The objective of This course East The study of The dynamic processes specific to coastal and littoral regions. It aims to give students expertise on The complexity of The process real And A spirit critical on Their modeling. This course himself decomposed in two parts Who treat respectively of hydraulics of The phenomena related has The swell And coastal sedimentary dynamics.

Knowledge prerequisites recommended :
To be able to continue teaching this subject, The student must have followed The teachings exempted In THE cycle of The classes preparatory (oceanography physical And marine physics), and in The first year of The second cycle (ocean dynamics and numerical analysis).

Content of The matter : 25h

1. Characterization of The states of sea

1.1. Classification states of sea
- Beaufort scale
- Ladder of Douglas

1.2. Characterization of The states of sea by geographic areas
1.3. Measure of The states of sea
1.4. Treatment statistical of The results

2. Swell real

2.1. Classification of The swell
2.2. Different models of swell
2.3. Settings of description of The swell

3. Statistical analysis of The real swell

3.1.1. Decomposition of a swell real in swells simple
3.1.2. Analysis wave by wave
3.1.3. Distribution of The wave heights
3.1.4. Determination of The significant amplitude
3.1.5. Determination of The period significant
3.1.6. Swells of project

4. Representation spectral of The states of sea

4.1. Description spectral of The states of sea
4.2. THE different types of specters

5. Wave mechanics

5.1. Wave Fundamentals and Classification of Waves
5.2. Elementary Progressive Wave Theory (Small-Amplitude Wave Theory)
- Wave Celerity, Length, and Period
- Tea Sinusoidal Wave Profile

- Local fluid velocities and acceleration
- Water particles displacements
- Surface pressure
- Velocity of has Wave Group
- Wave Energy and Power .
- Higher Order Wave Theories

5.3. Higher Order Wave Theories
5.4. Stokes' Progressive, Second-Order Wave Theory
- Wave Speed, Length, and Surface Profile
- Water Particle Velocities and Displacements
- Mass Transportation Velocity
- Subsurface Pressure
- Maximum Steepness of Progressive Waves
- Comparison of tea First- and Second-Order Theories

5.5. Cnoidal Waves
5.6. Solitary Wave Theory

6. The evolution of The swell in outside of The sea wind

6.1. Spread of The swell
6.2. Schooling of The swell
6.3. Refraction of The swell
- Refraction by The bathymetry

6.4. Diffraction of The swell
- Calculation of diffraction
- Diffraction of The swell on The breakwaters
- Diffraction of The swell on the piers of a port
- Combined refraction- diffraction

6.5. Reflection of The swell
- Reflection of The swell on The structures waterproofs, walls vertical (Linear Theory)
- Reflection in a closed pool
- Reflection of The swell on a slope plane, beaches, THE revetments and breakwaters
- Reflection of The swell on a bathymetry variable
- Refraction of The reflected waves

6.6. The cuttlefish
6.7. The tsunamis

7. The Surge of The waves

7.1. Systems of currents related At surge
7.2. Different types of surge
- Sliding surge
- Surge diving
- Surge frontal
- Surge has collapse

7.3. Analysis of surge
7.4. Conditions of The surge
7.5. Height of swell in The area of surge

8. Currents generated by The swell

8.1. Plan general of The currents sailors

8.2. Transportation of mass
8.3. Fluent coastline of has The swell
- Longitudinal currents
- Cross currents

8.4. Currents coastlines and THE transportation sedimentary

Program of The works directed: 20h.

TD1- Classification and measure states of sea
TD2- Classification, forecast , observation and measure of The swell
TD3 - Analysis statistical of The swell real
TD4- Representation spectral of The states of sea And Treatment of signal waves
TD5 - Calculation The settings of The swell (The length wave, The height, The speed of phase, The group velocity, horizontal and vertical velocity of water particles, acceleration of water particles, wave energy, etc.)
TD6- Refraction of The swell
TD7- diffraction and reflection of The swell
TD8 - Modeling digital of The spread of The swell of wide towards The side by THE SWAN model, swach\
TD6- Modeling of The currents sailors

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, tutorials, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 3		
Titled of The EU : Methodology		
Titled of The matter : Applied modeling		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching : The objective of this matter East to learn to students the different techniques of The modeling Who allow a best valuation of The data using many software programs (SWAN, MIKE21, CROCOO, etc.).

Knowledge prerequisites recommended :
In order to benefit from The teaching of this subject, The student must have followed The courses given in The preparatory classes (in particular marine physics), Then The subjects of The second cycle And more particularly oceanography physical, The dynamic of The oceans, analysis and numerical modeling, hydrodynamics coastal and coastal and underwater geomorphology.

Content of The matter : 22.5h

I. Introduction general has The modeling applied

I.1. Modeling And models: principle and concepts
I.2. THE steps of The modeling And of coding digital.

II. Modeling digital in area Navy And coastal

II .1. Presentation of The tools of modeling digital

1. Introduction At model Mike 21

1.1. Theoretical principles
1.2. The platforms of modeling of DHI
1.3. Description of The model (Mike 21)
1.4. Implementation of model : Mike Zero
1.5. Mesh of initial calculation
- Mesh For The simulation regional of The waves
- Mesh For The simulation of waves local

1.6. Creation of a bathymetric
1.7. Simulation of The propagation of The swell : Module SW
1.8. Simulation of The fields of currents generated by The swell And THE winds : Module HD
1.9. Simulation of transportation sedimentary below The effect of swell And current:Module ST
1.10. Mike 21/3 FMcoupled model, manuals And instructions for use.

2. Introduction At model SWAN

2.1. Theoretical principles
2.2. Features of The swell modeled In SWAN
2.3. Constraints And boundaries of model
2.4. Presentation of The numerical results

3. Introduction At model CROCODILE

3.1. THE equations primitives of model CROCODILE
3.2. Approximations And hypoTheses of The model
3.3. Configuration of field of study
3.4. Grilles digital of model
3.5. Parameterization of The model

3.6. The conditions to boundaries
3.7. The initial conditions
3.8. The Performances of Model

Program of The works Practices :22.5h

1. Georeferencing And digitalization of The maps bathymetric below Mike Zero (**3h**).
2. Modeling of The spread of The waves, of hydrodynamics coastal And of transportation non-cohesive sediments under Mike 21/3 FM (**7.5h**).
3. Preparation of text of order, of The grid And execution of model (Run SWAN) (**6h**).
4. Configuration of model CROCODILE And application on The sea Mediterranean (**6h**).

4.1. Facility of The model
4.2. Preparation of The grid, forcing and condition to boundaries
4.3. Close Processing / initialization of The model And creation of files of initial results
4.4. Configuration, compilation And execution of model
4.5. Visualization of The results

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works Directed, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 3		
Titled of The EU : Methodology		
Titled of The matter : Remote sensing		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching : The objective of this matter East to learn to students the concepts fundamentals of satellite image processing. After a definition of remote sensing and a brief history, The student will learn how satellite images are acquired, what Their characteristics are, what errors affect The acquisition, how to correct Them and finally how to analyze Them.

Knowledge prerequisites recommended :
In order to of follow teaching of this matter, The student must to have follow up THE lessons given in The matter " Geology IV » from semester 4 of The 1st cycle of Courses Preparatory Sciences of The Sea. He must also have a good grounding in maThematics, statistics and geometry.

Content of The matter :

Course 1 : Introduction has The remote sensing (1h30)

- Definition
- Historical
- Applications of The remote sensing In management And The protection of coastline
- Settings oceanic measures by remote sensing
- Systems permanent observation And Emergence of oceanography operational
- Interest scientist, economic And strategic of The remote sensing

Course 2 : Orbits, Satellites And Sensors (1h30)

- Types of orbits (LEO, MEO, GEO)
- Types of satellites (active/passive)
- Types of sensors (panchromatic, multispectral)

Course 3 : Physical bases of The passive remote sensing(2 * 1h30)

- The radiation electromagnetic (REM) And his properties
- The spectrum electromagnetic And her interest in remote sensing
- Energy of a wave EOM And physical quantities
- Interaction radiation and atmosphere
- Windows atmospheric useful in remote sensing
- Interaction radiation and matter
- Signature spectral

Course 4 : Picture satellite & its characteristics (1h30)

- Training of The image
- Characteristics (spatial resolution, spectral resolution, temporal resolution radiometric resolution)
- Improvement/Degradation of The features
- Levels of distribution of The DG
- Notions of format

Course 5 : Pretreatments of images (1h30)

- Corrections atmospheric (Why)?, approaches empirical/modeling)
- Geometric corrections (GC) (Why? When and How?, photogrammetric approach)

Course 6 : Treatment of images (TI)(3 * 1h30)

- Classification (supervised/unsupervised supervised, assessment of The precision)
- Filtering
- Calculation of clues
- Merger

Course 7: Post- processing (1h30)

- Statistics on The image
- Mosaicing
- Space mapping

Program of The works directed :
Applications has help of software GIS (ENVI, ERDAS, SNAP or SeaDAS)

TD 1 : Presentation of The software of treatments of images And of The bases of data open data online (6 hours):

- Facility of a software At choice
- Presentation of The environment of software
- Terms and conditions access to The bases of data in line
- Download of The data

TD 2 : Initiation has The handling of The images satellites I (6h)

- Reading of images In different formats, reading metadata ,
- Extraction spatial, spectral.
- Import/export
- Vector tools
- Use of The king (region of interest) etc.

TD 3 : Geometric correction (3h)

- Correction photogrammetric

TD 4 : Classification (6h)

- Supervised classification
- Classification No supervised

TD 5 : Filtering (3h)

- Sobel, prewith, etc
- Qualitative assessment

TD 6 : Index calculation (3h)

- Calculation of spectral indices

TD 7 : Fusion (3h)

- Panchromatic/multispectral fusion
- Qualitative evaluation

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, tutorials, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 3		
Titled of The EU : Transversal		
Titled of The matter : Development sustainable		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

This course aims to enable students to gain a comprehensive understanding of The various social, economic, environmental and cultural dimensions of development and to understand Their complexity. Students will acquire knowledge about The concept of development. sustainable And its bet in artwork has different scales. The analysis and the tools of follow-up will also be discussed.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have completed The 1st and 2nd year English language courses taught in The preparatory classes as well as The first semester of The 2nd year .

Content of The matter : 20h.

1. **Introduction**

- The model of current development and its limits.

2. **Historical and definitions**

- Birth of concept of development sustainable And its evolution
- Definitions of development sustainable

3. **Foundations And principles**

- THE three foundations of development sustainable
- Presentation of The principles of development sustainable

4. **Evolution of concept of sustainable development**

- Dates and conferences keys

5. **Actors And tools of development sustainable**

6. **The Goals of Development Sustainable (ODD)**

- Context and characteristics
- The 17 ODD
- The contributions of The ODD
- Actors of The ODD and Their contribution
- State of progress of The bet in work

7. **Measure THE development sustainable**

- The indicators
- The imprint ecological
- The Green PIB
- The Index of development human (HDI)

8. The companies And the development sustainable

- Historical
- The commitment of The companies In the development sustainable (benefits, methodology and application)
- THE challenges of development sustainable In the companies
- The responsibility social And environmental of The companies (RSEE)

9. Resilience

- Definitions
- The importance of The resilience
- Development sustainable And resilience

Program of The works directed: 10 h

- Presentation of The 17 ODD : consistency, targets, indicators, state current, examples of implementation initiatives.
- The development sustainable in Mediterranean : The Strategy Mediterranean For sustainable development and The state of its implementation
- The development sustainable in Algeria : Evolution, achievements And state of bet in artwork
- Bet in artwork of a plan of development sustainable of a city coastal

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, tests oral, homework, exposed, reports internship)

Titled of engineering : Genius Coastal And Development		
Semester : 3		
Titled of The EU : Transversal		
Titled of The matter : Projects management		
Volume hourly : 22.5 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

The objective of this module is to introduce The student to The basics and skills of project management, assess and anticipate risks, master The actors and authorities of a project, understand The roles and responsibilities in a project environment and also lead a project team.

Understanding The basics of project management and mastering The organization essentials for starting a project

Knowledge prerequisites recommended :

Content of The matter :

Chapter I : Project formalization

- Definitions and Typology
- The seven facets of management of project
- Cycle of life of project

Chapter II : General approach of The conduct of project

- Organization of project
  - Perimeter
  - Teams
  - Tasks and responsibility
  - Parts stakeholders of project
  - Matrix SWOT
- Planning of project
  - Diagram of GANTT, PERT
  - Management of The finances
  - Management of The risks And opportunities
- Steering of project
  - Follow up resources
  - Indicator of piloting
  - Approach quality
- Communication of project
  - Means of communication
  - Communication plan

Chapter III : Studies technical and economic of project

- Case studies

Program of The works directed : Exercises, Exhibits, Studies of case
Assessment method: • Exam of end of semester • Controls continuous : (tests in sessions of course, tutorials, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 3		
Titled of The EU : Discovery		
Titled of The matter : Scientific English 3		
Volume hourly : 22.5 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

The student's progress must be made by strengthening his or her skills in describing different shapes: one-dimensional, two-dimensional or three-dimensional.

Future engineers will be called upon to apply The different procedures " processes", such as function and capacity, The relationship between cause and effect, The logical sequence of sequences, and The method which differs from one process to another.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have completed The 1st and 2nd year English language courses provided in The preparatory classes as well as The 1st specialty year.

Content of The matter :

Unit 1 : Shapes

- One dimensional shapes
- Two dimensional shapes
- Three dimensional shapes
- Exercises
- lexicon

Evaluation

Unit 2 : Process 1 Functions and ability

- Function of devices
- Instruments
- Ability and capacity
- Exercises
- lexicon

Evaluation

Unit 3 : Process 2 Cause and effect

- Actions and results
- Changes of state
- Causing, allowing and preventing
- Exercises
- lexicon

Evaluation

Unit 4 : Process 3 Purpose and Method

- How things should be done

- How things may be done - Describing experiments -Exercises -lexicon -Assessment
Program of The works directed :
Assessment method: • Exam of end of semester • Controls continuous : (tests in sessions of course, oral exams, homework, exposed)

SEMESTER 4

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Fundamental		
Titled of The matter : Coastal sedimentary dynamics		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :
This subject aims to improve understanding of The interactions between processes hydro-sedimentary and The morphological evolution of The coastline.

Knowledge prerequisites recommended :
To be able to continue teaching this subject, The student must have followed The teaching provided in The preparatory classes cycle (physical oceanography), The
Semester 1 (physical navy), THE Semester 2 (dynamics oceanic), Geomorphology coastline and underwater I, Coastal and littoral hydrodynamics and semester 4 (seabed geology).

Content of The matter : 22.5h

I. Characterization of The sediments coastlines
- I.1. Composition of sediments coastlines
- I.2. Granulometry of The sediments
- I.3. Distribution of The grain size sediments

II. Morphology of The beaches And sedimentary balance
- II.1. Factors balance sedimentary of The beaches
- II.2. Distribution of The granulometries In The profile
- II.3. Distribution of The granulometries THE long of line of side
- II.4. Abrasion of The coastal sediments
- II.5. Roughness sediments and shape beaches
- II.6. The structures sedimentary

III. Fashion, mechanism And process of transportation coastline
- III.1. The behavior of The sands sailors
- III.2. The mechanisms of transportation coastline
- III.3. Transportation coastline by The swell And THE currents
  - III.3.1. Transportation by shore jet
  - III.3.2. Transportation by coastal current
- III.4. Transportation coastline by The wind

IV. The speed of fall (settlement velocity) of The sediments sailors
- IV.1. Definitions And knowledge
- IV.2. The diameter of dimensionless grain (D_*)
- IV.3. The formula of Gibbs et al., 1971

IV.4. The formula of Hallermeier, 1981

IV.5. The formula of Van Rijn, 1984

IV.6. The formula of Soulsby, 1997-2005

IV.7. The speed of fall of sediments hampered (W_{sC})

V. The constraint of shear (Bed shear stresses)

V.1. Introduction

V.2. The setting of Shields (θ)

V.3. The roughness of bottom marine

V.4. The constraint of shear due At fluent marine

V.5. The constraint of shear due to waves

V.6. The constraint of shear due has The action combined of The hydrodynamic agents

V.7. The constraint of shear critical

V.7.1. Introductory note

V.7.2. The setting of Shields critical (θ_{cr})

V.7.3. The formula of Soulsby And Whitehouse, 1997

VI. THE Transportation longitudinal sedimentary

VI.1. Definitions And knowledge

VI.2. The formulas of calculation of transportation sedimentary longitudinal

VI.3. Comparisons and critics

VII. Influence of The works on The sedimentary dynamics

VII.1. Action in The profile

VII.2. Longitudinal actions

VII.3. Scouring of marine sediments

VIII. Dynamic sedimentary canyons submarines

VIII.1. Reminder

VIII.2. Origin canyons submarines

VIII.3. Mechanisms of transportation sedimentary to The interior of The canyons submarines

Program of The tutorials : 22.5h.

1. Classification of The sediments sailors
2. Calculation of speed of fall and the speed of hindered fall.
3. Calculation of The constraint of shear
4. Calculation of The constraint of critical shear
5. Estimate of transportation sedimentary longitudinal

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Fundamental		
Titled of The matter : Marine geotechnics		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

In this subject, The student will have The opportunity to acquire knowledge about The foundations and works in geotechnical. The objective of This course East The study of The mechanical And The soil dynamics on maritime structures as well as liquefaction and landslide phonemes. It will be able to calculate and verify The stability of certain structures.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student is required to know: Geotechnics 1, geotechnical 2, resistance of The materials, concrete armed And prestressed And THE in situ tests.

Content of The matter :27h

Chapter 1 : Introduction has The marine geotechnics *(1.5 hours)*

- who is it that The geotechnical navy
- Object of The geotechnical
- Origin, historical And development of The marine geotechnology
- The soils below - sailors
- Origin And training of The sediments sailors
- Disciplines of The geotechnical navy
- The areas application

Chapter 2 : Properties of marine soils *(3h)*

Part 1. Properties physical of The sediments sailors (1.5 hours)

- The features of The soils
  - Texture, Structure
  - Size, shape
- Non-cohesive sediment structure
- Structure of cohesive marine sediments
- Physical characteristics of marine sediments
- Geotechnical classification of marine soils
- Classification of soils by in-situ tests

- Part 2. Properties mechanical of The marine sediments (1.5h)
  - Laboratory testing of marine soils
  - Permeability of marine sediments
  - Compressibility of marine sediments
  - Shear strength of marine sediments
  - Effect of time on soil behaviour

Chapter 3 : Cyclic properties And dynamics of The sediments sailors *(1.5h)*

- Loading cyclic of ground
- Context Theoretical
- Clay below A loading cyclic
- Sand below A loading cyclic
- Effect of The plasticity of ground on The answer cyclic
- Loading dynamic of ground
- Classification of The types of loading dynamic
- Spread wave
- Law of behavior dynamic of ground
- Measure of The settings of behavior dynamic
- Interaction of The waves with of The funds sailors

Chapter 4 : Analysis of The liquefaction soils (*3h)*

- Definition of The liquefaction
- Variations of The liquefaction
- Susceptibility of The soils has The liquefaction
- Identification of The soils liquefiable
- Aspects of The liquefaction seismic
- Method of The devaluation of potential of liquefaction
- Assessment of potential of liquefaction-analysis in constraints totals
- Assessment of CRR has leave of The tests cyclical of laboratory
- Reinforcement of The soils liquefiable

Chapter 5 : Stability of The underwater slopes *(4.5h)*

- Different shapes of instability And states boundaries of stability general
- The types of slides
- The causes of The slides
- Classification of The slides submarines
- The coefficient of security
- The methods of calculation of stability of The slopes – plan of breakup straight
- The methods of calculation of stability of The slopes – plan of breakup rotational
- Stability seismic of The land in slope

Chapter 6 : The foundations marines (Pious) *(10.5h)*

Part 1. General information (1.5h)

- The foundations
- The pious
- Historical
- Domain application
- The role of The pious
- Classification of The pious
- Modes installation of stake

- SynThesis of classification of The pious
- Terms employment And choice of The pious

Part 2. Axial capacity (1.5h)

- THE fashion of functioning of The pious
- The assessment of The ability axial of The pious
- Notion of charge vertical critical
- Assessment of The ability bearing vertical of a stake isolated
- Assessment has leave of a essay of loading static
- Friction negative In THE pious

Part 3. Settling of The pious (1.5h)

- Introduction
- The methods empirical
- The methods of The Theory of elasticity
- The methods digital
- The methods of The curves tz, qz Or Theory of transfer of The charges

Part 4. Ability lateral (1.5h)

- THE fashion of functioning of The pious below The effect of a effort horizontal
- Resistance lateral of a stake isolated
- Classification of The methods analysis
- Assessment has leave of a essay of loading
- Assessment has leave of The methods of calculation

Part 5. Deflection of a stake charge laterally (1.5h)

- The formulation of balance static of stake
- Method of elasticity
- Method At module of reaction (Or of The curves P- Y)
- Methods digital
- Methods empirical

Part 6. Behavior of groups of pious (1.5h)

- Assessment of The ability bearing vertical of a band of pious
- Settlement of a band of pious
- Assessment of The ability bearing horizontal of a band of pious
- Assessment of friction negative maximum For A band of pious

Part 7. Effect of loading cyclical (1.5h)

- Definition of loading cyclic
- Difference between A loading cyclic And dynamic
- Characterization of The answer cyclic
- Answer axial At loading cyclic
- Answer lateral At loading cyclic
- Assessment has leave of a essay of loading cyclic
- Construction And facility of structures of The pious

Chapter 7 : Design And sizing of The curtains in sheet pile ***(3h)***

- THE different types of sheet pile
- Calculation of The pressure of The lands on A curtain of sheet pile
- Sizing of a curtain of sheet pile
- Methods of calculation of The curtains in sheet pile
- Verification of ultimate limit states
- Verification of serviceability limit states
- Implementation of The curtains in sheet pile in site marine And coastal

Program of The works directed 18h

TD 1: Properties of marine soils (3 hours)
TD 3 : Properties Cyclic And Dynamic of The sediments sailors (1.5h)
TD 4: Analysis of soil liquefaction (1.5h)
TD 5 : Stability of The slopes submarines (3h)
TD 6: Marine foundations (6h)
TD 7 : Design And sizing of The curtains in sheet pile (3h)

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works directed, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Fundamental		
Titled of The matter : : **Geology of the seabed**		
Volume hourly : 35 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :
To have all the necessary For explore the seabed And perform of The samples.

Knowledge prerequisites recommended :
To be able to continue teaching this subject, The student must have followed The teaching provided in The preparatory classes cycle geology, physics marine, dynamic oceanic, Geomorphology coastal And below navy And Hydrodynamic coastal.

Content of The matter : 20h.

1. Introduction to methods of prospecting direct And indirect
2. Prospecting gravimetric
3. Prospecting seismic
4. Prospecting electric
5. Essay pressuremeter
6. Essay penetrometer
7. Essay scessiometric

Program of The practical work : 15h

1. TD Prospecting gravimetric
2. TD Prospecting seismic
3. TD Prospecting electric

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Methodology		
Titled of The matter : Design and computer-aided drawing (CAO/DAO)		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

This matter " Design and computer-aided drawing " allow has The student of draw in two and/or three dimensions, from small to large scale and with high precision, studying an impressive series of tools for tracing, presentation, visualization, etc.

The objective of this teaching unit East to initiate THE students has The reading of The plans execution, The mastery of The functions essential of a software of drawing, The production And modifying plans using The drawing software.

Knowledge prerequisites recommended :

A Good mastery of The environment Windows And of drawing technical are A asset, but No prior CAD/CAM knowledge is required.

Content of The matter : 22.5h

Chapter 1: General information

I. Introduction General
II. The software DAO
III. Principles of base of The software DAO
IV. Utilities of The DAO

Chapter 2: Initiation to The DAO

I. Interface user
II. reading of The plans

Chapter 3 :The perspectives drawing

I. Different types of perspectives
II. Intersections
III. General plan
IV. Cuts And sections
V. Views
- Choice And arrangement of The views
- Determination of The 3rd view has leave of two views data.

VI. Quoting

Chapter 4 : Concepts of sketches

I. Layers : creation, management, settings
II. Scales, cartridges
III. Tools of drawing 2D: creation, transformation
IV. Annotations : quotation, texts, lines of landmark
V. Blocks : creation, management
VI. Hatching
VII. Saving

VIII. Printing

Chapter 5 : 3D Drawing

I. Layout of Site Plans (Plan View) "Maritime, Port, Hydraulic Structures, etc

II. Creation of Longitudinal and Cross-Sectional Profiles

III. 3D Design and Perspective

Directed works Program 22 .5h

1- Basic Principles of DAO Software
2- Reading Plans
3- Drawing Perspective
4- Basic Sketching
5- Layout of Site Plans (Plan View) "Maritime, Port, Hydraulic Structures, etc."
6- Creation of Longitudinal and Cross-Sectional Profiles
7- 3D Design and Perspective

Assessment Method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework, presentations, internship reports)

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Methodology		
Titled of The matter : GIS Mapping 2		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

The objective of this subject is to carry out a mini-GIS project with educational purposes which focuses on The development of a site on The Algerian coast. Its aim is to introduce students to The concepts and methodologies of Geographic Information Systems via GIS software. Emphasis will be placed on practical work in order to enable The student to acquire The skills techniques in graphics And in mapping him allowing of realize of The quality cartographic documents. To complete The project, The student will not only have to use GIS but also The fundamental concepts acquired during Their specialized course (coastal planning, maritime law, coastal geomorphology, etc.). The student will also have to conclude Their project by writing a final report and presenting Their results orally, which will allow Them to improve Their communication skills.

Knowledge prerequisites recommended :

In order to of follow teaching of this matter, The student must to have follow up THE lessons given In THE two materials " GIS And mapping: Initiation » of Semester 1 And " Remote sensing » of Semester 3. Of The bases in Geomorphology coastline And underwater are required as well as in coastal development.

Content of The matter : 9h.

Course 1 : Reminders on GIS and THE systems of references (1h30) :

- Definition of The GIS
- Geolocation : concepts of geodesy, Systems of reference (systems of geographic and projected coordinates)
- The sources and the types of data in The GIS
- Techniques integration of The data In A GIS

Course 2 : Presentation of project GIS development of a area coastal (3h)

- Definition of The objective of The project
- Study of The regulations in force (coastal law)
- Presentation of The study area
- To study the need (necessary data)
- Determine the steps of work And The methodology has follow (spatial analysis)
- Fix THE products has realize (cards, statistics)

Course 3 : Morphometry of field (1h30)

- The map topographical and representation of relief
- Techniques of study of The topography
- The model digital of ground (MNT) and The model digital elevation
- Applications on the MNT

Course 4 : The map marine (1h30)

- Definition, objective and components
- Reading of a marine map (meaning of colors, probes, annotations, etc.)

Course 5 : Followed by evolution of The coastline with The extension DSAS (1h30)

- Definition of The position of The coastline
- Sources of data For The study of The evolution of The coastline
- Principle of The extension DSAS
- Format of The data in entrance
- Definition of The settings calculated And Their interpretation

Program of The works directed 36 hours

Applications has help of software GIS (ArcGIS or QGis)

TD 1 : Model conceptual of The project And creation of The geodatabase (6h):

- Reflection on The model conceptual
- Creation And structuring of The geodatabase
- Creation vectors
- Digitalization And filling tables

TD 2 : Analysis space (3 hours)

- Application of geo-processing And requests in order of respond to The problematic
- Calculation of statistics on The results And Their interpretation

TD 3 : Cartographic writing (3 hours)

- Creation of maps to present The results (Thematic analysis and cartographic design)

TD 4 : Morphometrics of field (6h)

- Processing a Digital Terrain Model (MNT) : determination of The watershed of an Algerian wadi, reconstruction of its hydrographic network, calculations of some morphometric parameters.
- Card making : map of The hydrographic network of a watershed, map of slopes and Their orientation, hypsometric map
- Creation of a MNT to from raised topographical
- Creation of a MNT to leave of The curves of level
- Extraction of The topography layers And hydrography of The area of study

TD 5 : Preparation of a map of bathymetry (3h)

- Exploration of a map navy Algerian And download of maps marines from online databases
- Georeferencing of The map And digitalization of The raised bathymetric
- Creation of a raster interpolation of bathymetry And generation of isobaths
- Creation of a map of bathymetry of The area of study

TD 6 : Followed by evolution of The line of coast by coast The DSAS extension (6h)

- Facility of The DSAS extension
- Preparation of The input data
- Execution of The workflow and calculation statistics

- Realization of maps And interpretation results

TD 7 : Evolution of urbanization of The area of study (3h)

- Download of a picture recent of The area of study
- Edition of The vectors (put has day) And calculation of statistics
- Preparation of a map devolution of urbanization
- Interpretation of The results
- Use of methods automatic for The mapping of urbanization : supervised classification, urbanization index

TD 8 : Initiation has automation of The tasks (3h)

- Methods automation of The tasks In THE GIS
- Initiation At Model Builder from ArcGIS (Or equivalent In A software SIG)
- Design And execution of a few chains of treatments

TD 9 : Writing of final report And oral presentation of The results of The project (3h)

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works directed, tests oral, homework)

Titled of engineering : Genius Coastal And Development		
Semester : 4		
Titled of The EU : Methodology		
Titled of The matter : Artificial Intelligence applied to geosciences		
Volume hourly : 50 hours	**Credits : 4**	**Coefficients : 3**

Goals of teaching :

The course East constituted of two parts has know The analysis of The data And The Machine Learning. The first part aims to analyze The data in order to derive answers to The problems that concern The field.

Machine learning (ML) is a form of artificial intelligence (AI) that focuses on creation of systems that learn, or improve Their performance, based on The data They process. It represents The field that deals with The interpretation and modeling of data in order to enable decision making without human interaction.

Knowledge prerequisites recommended :

For power pursue THE teachings of this matter, The student must to have knowledge of numerical analysis and programming with Python, Matlab

Content of The matter : 25h

1- Identify the possibilities of Machine Learning

- Discover the domain of The Data Science
- Identify the different steps of modeling
- Identify the different types learning automatic

2- Introduction to Python

- Numpy
- MathPlotlib
- Pandas

3- **Identify the techniques And tools of Machine Learning**

- **Transform of The needs professions in problems of Machine**

Learning 4- Data cleaning

- Data Cleaning with Excel.
- Data Cleaning with Python.

5- Data Analysis

- Mean.
- Variance.
- Histograms.

6- Classification

- Logistics Regression.
- Validation.
- Support Vector Machine
- Artificial Neural Network

7- Train THE first algorithm of Machine Learning

- Establish A model statistical
- Program The linear regression
- Validation.
- Regression Polynomial.
- Decision Trees.

Program of The works practices 25h

- TD1- Identify the different steps modeling
- TD2-Identify the different types machine learning
- TD3- algorithm with python
- TD4- Transform needs problematic jobs of Machine Learning
- TD5-Data Cleaning with Excel.
- TD6-Data Cleaning with Python.
- TD7- Data analysis
- TD8- classification with machine learning
- TD9-programming

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Methodology		
Titled of The matter : Internship		
Volume hourly : 60 hours	**Credits : 4**	**Coefficients : 3**
Goals of teaching : A internship of insertion of 15 days (60 hours) is planned for this Semester. The objective of this internship is to apply The knowledge acquired to address a problem on coastal georgies or to master coastal engineering tools, coastal development and to acquire oTher methodological, organizational or communication skills.		
Knowledge prerequisites recommended : -		
Content of The matter : 60h		
<u>Assessment method:</u> • Internship report • Assessment of The company • Oral presentation		

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Discovery		
Titled of The matter : Law of the Sea		
Volume hourly : 25 hours	**Credits : 25**	**Coefficients : 1**
Goals of teaching : To know all the regulations Who govern The sea.		
Knowledge prerequisites recommended : -		

Content of The matter : 25h

1 - Maritime areas

1.1 - The maritime areas generals

1.1.1 The inland waters

1.1.2 The territorial sea

1.1.3 The area contiguous

1.1.4 The area exclusive economic

1.1.5 The continental shelf

1.1.6 The high sea

1.1.6 The seabed

2 – The research scientist navy

2.1 Diet of The research scientist In The territorial sea

2.2 Regime of scientific research in The exclusive economic zone And The continental shelf

3 – The preservation of medium marine

3.1 The prevention of pollution

3.1.1 The pollution voluntary

3.1.2 The accidental pollution

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 4		
Titled of The EU : Discovery		
Titled of The matter : Scientific English 4		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

The program includes writing internship reports for services provided in various organizations. After completing The university course, students must be able to write job applications and prepare Their CV, as well as prepare for interviews.

This semester is based on The personal research work of The student who must put into practice all his know-how in order to prepare necessary documents that reflect years of learning, wheTher technical as a future engineer and at The same time assess one's linguistic background in writing and speaking.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have completed The 1st and 2nd year English language courses provided in The preparatory classes as well as The 1st year specialty.

Content of The matter 30h

Unit 1:Writing reports

Exercises

Assessment

Unit 2 : Application Forms

Evaluation

Exercises

Unit 3 : Preparation CVs

Evaluation

Exercises

Unit 4: **Oral Interviews and Tips**

-Questions and answers: Speaking about your skills

-Play role activities for students

Evaluation

Program of The works practices: 22.5h

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, tests oral, homework)

SEMESTER 5

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Fundamental		
Titled of The matter : Design maritime structures		
Volume hourly : 60 hours	**Credits : 5**	**Coefficients : 3**

Goals of teaching :

This matter aims to prepare students wishing to work in The field of port engineering, development and defense of coastal areas and dimensioning of structures. The development of ports, commercial, fishing or recreational, requires The training of professionals at The engineering level capable of designing port facilities or coastal protection structures with a concern environmental impact assessment in The context of sustainable development. The training is thus focused on acquiring knowledge in The areas of coastal zone planning and protection, port structures, coastal defense works as well as environmental impact forecasting for The installation of such structures.

Knowledge prerequisites recommended :

For power pursue THE teachings of this matter, The student must to have follow up THE courses given in semester 3 (coastal engineering), Coastal and littoral hydrodynamics

Content of The matter : 30h

1. **General information**
   - 1.1. Reminder on The Theory linear of The swell
   - 1.2. The swell of project : limit states and values
   - 1.3. THE different types of dikes

2. **Use of The concrete in maritime site**
   - 2.1. General information on THE concrete
   - 2.2. Specificities of The works in concrete in environment maritime

- Typology of The works
- Construction
- Aggressiveness of medium

2.3. Concrete in site maritime, requirements And specifications

- Requirements performance-based
- Reference technical
- Provisions
- Sustainability And performance approach
- Concrete to news performances
- Armatures in steel stainless

2.4. Implementation in artwork of concrete

- Structures castings in place

- Prefabrication
- Environment

2.5. Control of quality
- Requirements of case consultation companies
- Analysis offers
- External control

2.6. Management of The works
- Constructive provisions
- Monitoring
- Follow up of The settings of sustainability of concrete

3. Design And sizing of The dikes has embankment

3.1. Constitution of The dikes on The slope
3.2. Criteria of sizing of The dikes on The slope
3.3. Sizing of The blocks of The shell
3.3.1. Stability of The blocks of The shell
- HUDSON's formula
- Formula of VAN DEER SEA

3.3.2. Dikes passable And submersibles
3.3.3. Sizing of The submersible dikes
3.3.4. Breakup blocks of The shell
3.3.5. Laid of The artificial blocks

3.4. Sizing of The filters, stops, coronation
3.5. Performance hydraulic
3.5.1. Performance linked hydraulics has The swell
- Definitions And settings
- Run-up of The swell
- Crossing of The swell
- Transmission of The swell
- Reflection of The swell

3.5.2. Performance hydraulic linked to currents
- Settings sizing
- Flow internal

3.6. Surveillance. Maintenance. Repairs
3.7. Pathology of The dikes on The slope

4. Design And sizing of The vertical dikes

4.1. Constitution of The dikes vertical
4.2. Criteria of sizing of The vertical dikes
4.3. Performance linked hydraulics has The swell
4.4. Performance hydraulic linked to currents
4.5. Monitoring. Maintenance. Repairs
4.6. Constitution And sizing of The dikes mixed

5. Design of The docks on piles

5.1. General designs

5.1.1. Classification of The docks on pious
5.1.2. Elements constituents of a dock on pious
5.2. Pious below vertical load
5.3. Pious below efforts horizontal
5.4. Calculation overall of dock
5.4.1. Dock has rigid platform
5.4.2. Dock has platform stiffened In THE longitudinal direction
5.5. Resistance intrinsic of The pious
5.5.1. Pious metallic
5.5.2. Pious metallic filled of concrete
5.6. Efforts hydrodynamics on THE pious
5.6.1. Pious submitted to The swell
5.6.2. Stake fixed in a current

6. **Design And sizing of The curtains sheet pile**
6.1. THE different types sheet pile
6.2. Sizing of a curtain of sheet pile
6.3. Methods of calculation curtains in sheet pile
6.4. Application of The studies Theoretical And experimental At calculation curtains
6.5. Implementation curtains in sheet pile in site marine And coastal

Program of The works directed : 30h

1. Calculation of The swell of project, The swell deferential At foot of The work
2. Concrete prestressing in site maritime
3. Design And sizing of The dikes has embankment
4. Performance hydraulic linked has The swell : Run-up of The swell, crossing of swell, swell transmission, swell reflection
5. Design And sizing of The dikes vertical
6. Design of The docks on piles
7. Design And sizing of The curtains in sheet pile

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Fundamental		
Titled of The matter : Physical modeling		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

This subject aims to prepare students wishing to work in The field of coastal engineering and geotechnics in The context of The design of various structures in The laboratory. It studies The various physical phenomena that determine The hydraulic performance and structural response of structures. It provides information on The values to be used in preliminary study tools. These include site conditions (wave, currents, ice and geotechnical characteristics) which cannot generally be modified by The designer.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have followed The teachings exempted In THE Semester 1 (physical navy, modeling), THE Semester 2 (ocean dynamics) semester 3 (coastal engineering, coastal and littoral hydrodynamics, applied modeling) and calculation of structures.

Content of The subject : 22.5 h

1. Introduction has The modeling physical

1.1. What is physical modeling?
1.2. What objectives can physical modeling achieve?

2. Analysis dimensional

2.1. Dimensions
2.1.1. Dimensions physical and systems of The units
2.1.2. Conversion of The dimensional units
2.2. Principles analysis dimensional
2.2.1. Homogeneity dimensional
2.2.2. Prepare has carry out a dimensional analysis
2.2.3. Form of The products dimensionless
2.2.4. The sets complete with products dimensionless

3. Principles of The similarity

3.1. Concept of The similarity
3.2. Requirement of The similarity
3.3. Postman of scale
3.4. Geometric similarity
3.5. Kinematic similarity
3.6. Dynamic similarity
3.7. Laws of similarity
3.8. Hydraulic similarity
3.8.1. Aspects practices of The hydraulic similarity
3.8.2. Criteria hydraulics specific :
- Similarity from FROUDE

- Similarity de REYNOLDS
- Incompatibility similarities" of FROUDE and of REYNOLDS
- Distortion of The hydraulic models

4. Hydrodynamic models

4.1. Introduction to models hydrodynamics
4.1.1. Model hydrodynamic For the short waves
4.1.2. Model hydrodynamic For the long waves

5. Models of structures coastal

5.1. Introduction to The models of The structures
5.1.1. Types of structures coastal
5.1.2. Objective And The requirement of The models of structures coastal
5.2. THE structures in rockfill
5.2.1. Requirements of The scale For the structures in rockfill
5.2.1. Model of The structures in rockfill in The laboratory And effect of scale
5.2.2. Verification of model of The structures in rockfill
5.2.3. Selection of scale of model of The structures in rockfill
5.2.4. Procedure of modeling of The structures in rockfill
5.3. THE dikes has impermeable slopes
5.3.1. Requirements of The scale For the dikes has impermeable slopes
5.3.2. Model of The dikes has embankment raincoats in laboratory And effect of scale
5.3.3. Verification of model of The dikes has impermeable slopes
5.3.4. Selection of scale of model of dikes has impermeable slopes
5.3.5. Construction of model of The dikes at embankment raincoats
5.4. THE walls vertical
5.4.1. Requirements of The scale For the vertical walls
5.4.2. Model of The walls vertical in laboratory And scale effect
5.4.3. Verification of model of The vertical walls
5.4.4. Selection of scale of model of The walls vertical
5.4.5. Construction of model of The vertical walls
5.5. THE structures floating
5.5.1. Requirements of The scale For the structures floating
5.5.2. Model of The structures floating in laboratory And effect of scale
5.5.3. Verification of model of The structures floating
5.5.4. Selection of scale of model of The structures floating
5.5.5. Construction of model of The structures floating

6. Model of transportation sedimentary

6.2. Introduction At model of transportation sedimentary
6.3. similarity models to fixed, undistorted funds
6.4. similarity models to distorted fixed funds
6.5. similarity of The models to mobile fund
6.5.1. Introduction At model to bottom mobile
6.5.2. Requirements of model to movable floor
- Analysis dimensional for the transportation sedimentary
- General difficulties of The similarity

6.5.3. Currents and mobile funds
6.6. the transportation sedimentary by thrust
6.6.1. study quantitative (tractive force. speed of shear laws of thrust)
6.6.2. Scales of constraint shear
6.6.3. Requirement of scale transportation by thrust

6.6.4. Requirement " model best »
6.6.5. Requirement " light weight model »
6.6.6. Requirement " densimetric Froude model »
6.7. the transportation sedimentary by suspension
6.7.1. Criteria of scale without dependence of speed of fall
6.7.2. Criteria of scale addicted of The speed of fall
6.7.3. Modeling of transportation sedimentary in suspension
6.7.4. Effect of scale For the model transportation sedimentary suspended

7. Simulation of The environment physical

7.2. the approaches of The work
7.2.1. Tests two-dimensional in channels
7.2.2. Tests three-dimensional in tank
7.3. The agitation
7.3.1. the constraints of this simulation
7.3.2. Control of The blades And observation of Their effects
7.3.3. Quantification of The damages In the tests of piers on The slope

Program of The works practices : 22.5h

1- Dimensions physical and systems of The units
2- Application of The laws of similarity
3- Similarity of FROUDE and The similarity of REYNOLDS
4- Model hydrodynamic For the short waves
5- Model of The structures in rockfill in The laboratory And effect of scale
6- Model of The dikes has embankment raincoats in The laboratory And scale effect
7- Model of The structures floating in laboratory And effect of scale
8- Similarity of The models at The bottom fixed undistorted
9- Similarity of The models has funds mobile
10- Model of transportation sedimentary
11- Simulation of The environment physical

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Fundamental		
Titled of The matter : Coastal Zone Management		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

This course aims to provide students with the necessary knowledge about The complexity of marine and coastal areas, characterized by the remarkable and fragile ecosystems They shelter and The diversity of the activities And of the uses confined there. The objective final being to apprehend The process And the tools management sustainable of These spaces Who must take consideration the ecological, environmental, socio-economic, institutional and regulatory aspects while mobilizing a multitude of actors.

Knowledge prerequisites recommended :

For power pursue THE teachings of this matter, The student must to have follow up the lessons given in semesters 1 and 2 (coastal development)

Content of The matter : 30h

I. Introduction

- The coastal area And navy : Perception and reality
- The management areas marines And coastal
- The approach ecosystemic

II. Management integrated of The areas coastal

- Approach and context, definitions
- Historical
- Principles fundamentals of The GIZC
- The different types integration
- Principle And progress of process GIZC
- The GIZC: A tool of development sustainable ?
- The tools of The GIZC And its bet in work
- The actors of The GIZC
- Follow up And assessment : The indicators

III. Analysis of sustainability systemic And prospective

- Definitions
- Method imagine

IV. The planning of The spaces maritime

- Definitions
- Historical
- Principles keys
- Steps of The bet in artwork of The PEM
- Links between The PSM And the other approaches integrated

Program of The works directed : 15h

1. Analysis of The actors: Method MACTOR
2. Exercise of simulation : workshops of actors For The development And The validation of a plan integrated management of a coastal municipality

3. Study And analysis of The strategy national GIZC of Algeria
4. Study And analysis of Plan of Development Coastal (PAC) Algerian
5. Study And analysis of The Coastal Plan from Réghaia
6. Application of The method prospective Imagine (method of The scenarios)
7. Exercise of planning of maritime space

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Fundamental		
Titled of The matter : Dredging and rock removal in the marine environment		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 2**

Goals of teaching :

This matter has For objective of realize of The works of genius port (digging of basins or channels), to maintain river or sea channels used by ships when They have been filled with sediment, to carry out backfilling operations to restore beaches or reclaim land from The sea or to extract marine aggregates to meet The needs of The construction sector.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have followed The teaching provided in The preparatory classes cycle (physical oceanography), The semester 1 (physical navy) And THE Semester 2 (dynamics oceanic), Geomorphology coastal and underwater I, coastal and coastal hydrodynamics and geotechnics.

Content of The matter : 15h.

I. The problematic operations dredging

II. The techniques of dredging And of rejection

- II.1. The dredges mechanical
- II.2. The dredges vacuum cleaners
- II.3. The bars graders
- II.4. The dredges tires
- II.5. The technique of The injection (" Jetsed ")
- II.6. Dredging in contaminated environment
- II.7. The techniques of rejection

III. The operations of dredging of The ports

- III.1. The port facilities
- III.2. Access to port facilities
- III.3. The terms and conditions of dredging
- III.4. Studies geotechnical on The dredging site
- III.5. The quality of The materials dredged
- III.6. Studies geotechnical on The site of placement.
- III 7. The fate of The dredged materials

IV. Impacts of dredging on The environment marine

IV.1. Physical chemistry of water

IV.2. Effects on The organizations

IV.3. Impacts on The Benthos

V. The management of The operations of dredging in Algeria

V.1. Introduction

V.2. The characterization of sediments

V.3. The guide values

V.4. The destination of The dredged materials

V.5. The valuation of The debris of dredging

V.6. The Cost of dredging

VI. Rock stripping in medium marine

VI.1. Introduction

VI.2. Definitions And concepts

VI.3. Benefits and disadvantages

V.3. The derectoge And natural risk

Program of The works directed : 15h.

1- Dredging of The sediments At level of The ports And of The access channels
2- Calculate The volume of sediments a dredged
3- Characterization And analysis of The sediments of dredging
4- Analysis physicochemical of The sediments dredged
5- Rejection of The dredged sediments
6- Valorization of The dredged sediments

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Methodology		
Titled of The matter : Diagnosis and monitoring of coastal structures		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 2**

Goals of teaching :

The objective may be to present The investigation methods practiced by The managers of protection and port works which can be used in The event of The discovery of disorders on maritime infrastructure. Certain methods can also be used to detect disorders in The context of asset management.

Knowledge prerequisites recommended :

To be able to continue teaching this subject, The student must have followed The teaching provided in The preparatory classes cycle (physical oceanography), The semester 1 (physical navy) And THE Semester 2 (dynamics oceanic), Geomorphology coastal and underwater I, coastal and coastal hydrodynamics and geotechnics.

Content of The matter : 30h

I. Issues of The infrastructure maritime and port
II. The investigations In The chain of diagnosis
  II.1. Investigations And diagnosis
  II.2. Criteria of selection of The investigations
    II.2.1. The needs of administrator
    II.2.1. The reliability of case of work
    II.2.1. The type of work
    II.2.1. The environment of The work
    II.2.1. The nature And The extent degradations
  II.2. THE investigation program
III. The cards 'Works'
  III.1. Content
    III.1.1. Description of The work
    III.1.2. Variants of The work
    III.1.3. Modes of degradation
    III.1.4. Painting cross : relevance and choice investigations
    III.1.5. Instrumentation And follow up
  III.2. Example
  III.3. Identification of The works
IV. THE cards 'Works'
  IV.1. Content
  IV.2. Example
  IV.3. Identification of The works
V. Example of plan investigations in Algeria

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Methodology		
Titled of The matter : Initiation to project engineering		
Volume hourly : 45 hours	**Credits : 4**	**Coefficients : 2**

Goals of teaching :

This subject concerns The initiation to The methodology of design and implementation of professional engineering projects related to The maritime domain, namely The writing and presentation of technical reports, The creation of plans after having identified The project, The use of bibliographic resources.

Prepare The student for The challenges of designing and carrying out professional projects for find technical solutions to marine and coastal engineering problems, and work effectively in a team. Also to make The student aware of The professional responsibilities of The engineer.

Knowledge prerequisites recommended :

THE knowledge acquired In The 4 semesters of The specialty.

Content of The matter : 9 h.

Chapter 1: General information (1h30)

1. Specifications Document
2. Technical Specifications and Special Conditions (CPT And CPS)
3. Terms to know : ODS, project owner, project manager, bid opening, provisional and final contract award,…
4. Submission (Technical Offer, Financial Offer)

Chapter 2: Study preliminary (6h)

1. Analysis of project (needs of master of work, objectives of project)
2. Collection of The data and analysis of The state places
3. Survey topographic And/ Or bathymetric
4. presentation of The variants (solutions summaries) according to the needs And the guidelines of The project owner
5. Report of The preliminary study + a summary plan of The variants
6. PV of reception and approval of The preliminary study with The choice of The variant

Chapter 3: Preliminary draft Detailed "APD » (9 h

1. Study of The variant selected (Description, Calculation, sizing,...of planned works)
2. Report of The study of APD with a bill of quantities and estimates
3. Plans (implantation, views in plan, cuts, plans of details,…..) to adequate scales
4. PV of reception and approval of detail of The selected variant

Chapter 4 : Execution file (4h30)

1. Plans execution to The scales adequate

2. Special prescriptions book (CPS)
3. PV of reception And of approval of execution file

Chapter 5: Tender Documents And invoicing (1h30)

Program of The works directed : 24 h

TD 1 : Book of The charges And submission " study of a case ". (2h00)
TD 2: Preliminary study. (6h.)
TD 3 : Preliminary draft Detailed " APD ". (8h.)
TD 4: Execution file. (6h.)
TD 5 : Tender Documents And invoicing. (2h)

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, works practices, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Discovery		
Titled of The matter: Impact study and environmental assessments		
Volume hourly : 30 hours	**Credits : 2**	**Coefficients : 1**

Goals of teaching :

This course is designed to provide an overview of the tools and methods used to identify, predict and assess different types of environmental impacts in The marine-coastal environment. It aims to gain knowledge of The functions And of The principles of a study impact on The environment coastal And The approach of The steps of her framing. Of The studies of case (presented by Thematic or (and) by professionals) will be The subject of analyses and comments.

Knowledge prerequisites recommended :

For power pursue THE teachings of this matter, The student must to have follow up lessons: Coastal development, coastal engineering.

Content of The matter : 30h

1. Introduction has The study impact

1.1 Meaning, scope, goals
1.2 History (evolution)
1.3 Frame legislative And regulatory Algerian

2. Acknowledgement of The state initial

2.1 Principles
2.2 Indicators of The state initial in coastal area
2.3 Method And analysis criteria
2.4 Sources of data And of information

3. Identification And analysis of The impacts

3.1 Awareness of project submitted has The EIE
3.2 Effects induced, typology of The impacts
3.3 Impacts crusaders (method)

4. Measures to take

4.1 The measures of deletion
4.2 The measures discount
4.3 The compensatory measures

5. part of TD: Study of case/ Workshop

5.1 Impacts of The port infrastructure
- Area industrial port
- Port of pleasure boating, port of fishing

5.2 Impacts of The dredging port (extraction, bet on deposit)
5.3 Impacts of extraction of The aggregates sailors
5.4 Impacts of a station of treatment waters worn out
5.5 EIE In the case of The areas expansion of The sites tourist (ZEST)

Assessment method:

- Exam of end of Semester
- Controls continuous : (tests in sessions of course, tests oral, homework)

Titled of engineering : Coastal Engineering And Development		
Semester : 5		
Titled of The EU : Discovery		
Titled of The matter : Hygiene Safety Environment (HSE)		
Volume hourly : 45 hours	**Credits : 3**	**Coefficients : 1**

Goals of teaching :

Training in health, safety and environment allows students to acquire a set of scientific, technical and managerial knowledge that serves as a basis for risk management during Their practical work and research. This also serves Them in environmental protection. It also allows engineers to easily integrate into The professional environment. and adaptation within companies.

Scientific, technical and technological knowledge. Regulatory and legal which defines The control and management of professional, technological and environmental risks. Managerial knowledge, through mastery of management systems

Knowledge prerequisites recommended :

Content of The matter : 30h

Chapter 1 :Organization, functioning And management of The activity

HSE Course No. 1: Introduction to HSE training

- Vision global on The training and his progress

Course No. 2 : Regulation And Standards HSE

- Regulation And standards Who manage The activity HSE
- Roles, responsibilities And authorities At breast companies

Chapter 2 :Prevention, intervention And mastery operational HSE Course

No. 3: Organization of prevention

- Principles And organs of prevention (INPRP, CNAS, Medicine of work, CPHS, inspection work, OPREBAPTH…)

Course No. 4 : Identification of The dangers, assessment of risks And operational mastery

- Identification, assessment And mastery of The risks professionals (risk chemical, biological, mechanical, electrical…)
- Identification, assessment And mastery of The risks technological (fire, blast…)
- Identification, assessment And mastery of The risks environmental (spill, pollution, etc.)

Course No. 5 : Classified installations For The protection of The environment (ICPE)

- Classification of The ICPE
- Management of The ICPE

Course No. 6: Study of hazard

- Frame legal
- Preparation And implementation artwork of The study of danger

Course No. 7 : Study impact on The environment

- Frame legal
- Preparation And bet in artwork of The study impact on The environment

Course No. 08 : Communication HSE

- Importance of The communication HSE in The company

- Techniques And means training, information And awareness HSE At breast companies

Course No. 09 : Organization of The intervention

- Vision global on The organization of The intervention
- Bet in artwork of The plans intervention
- Use of The means of first rescue.

Chapter 3: Management of The health, The security At work And of The environment Course No. 10: SSTE Management

- Introduction At management of The health, The security At work And of The environment
- Importance of management SSTE in the performance of The companies

Course No. 11 : System of management of The environment according to The standard ISO 14001 v 2015

- Bet in place of a system of management of The environment (SME)

Course No. 12 : System of management of The health And The security At work according to The standard ISO 45001 v 2018

- Implementation of an occupational health and safety management system (SMSST)

Course No. 13: Visit on site of a facility classified For The protection of The environment (Desalination plant, laboratory, water treatment plant, etc.)

- Choice And visit of a facility classified For The protection of The environment, For acquire know-how and put into practice acquired skills.

Others: The workshops And of The exercises of The case practices are included In the course For A better student learning.

Program of The works directed: 15h.

The works of synthesis And of The summaries will be requested to students After each course.

Assessment method:

- Exam of end of semester
- Controls continuous : (tests in sessions of course, works directed, tests oral, homework, presentations, internship reports)

IV. Agreements/Conventions

National conventions:

- Agreement for The establishment of The National Network of Higher Schools in The field of Natural and Life Sciences:
- Convention with The University Abou Bakr BELKAID from Tlemcen.
- Convention with The University of The Sciences and Technologies Houari BOUMEDIENE (USTHB) .
- Center of Research in Sciences Pharmaceuticals (CRSP).
- Center National of Research and of Development of The Fishing and of Aquaculture (CNRDPA).
- Group Algerian Corporate Universities (GACU).
- Center of Research Nuclear of Algiers (CRNA)
- Laboratory of Study Maritimes (LEM).
- GITRAMA (Maritime Works Infrastructure Group).
- Company of The Waters And of Sanitation of Algiers (SEAAL) (in course of signature).
- Plateau Technical of The USTHB.
- Agency National of The Waste (AND).
- DP World.
- CEI HALFAOUI.
- SPA CCS Industry.
- NEPHROPS Engineering Environmental.
- Institute National Superior of The Fishing And of Aquaculture (INSPA).
- Institute of Technologies of Peaches And of Aquaculture (ITPA Collo).
- School of Technical Training of fishing And Aquaculture of Beni-Saf (EFTPA).
- Direction of The Fishing and Resources Fisheries from Ain Temouchent.
- Spa Crops Marines – CULTMARE.
- Park National from Gouraya.
- Association For The Research, Information And Training Underwater (RECIF).
- Club diving KALYPSO submarine .

International conventions:

- University from Istanbul (Turkey).
- University from Ankara (Türkiye).
- University Akdeniz (Antalya, Türkiye).
- University International of The Sea (France).
- University of Nouakchott Al Aasria (Mauritania).