وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research
اللجنة البيداغوجية الوطنية لميدان العلوم و التكنولوجيا
National Pedagogical Committee for Science and Technology

HARMONIZATION

ACADEMIC MASTERS

2016 - 2017

Domain	Sector	Speciality
Science And Technologies	***Process Engineering***	***Pharmaceutical Engineering***

الجمهورية الجزائرية الديمقراطية الشعبيةPeople's Democratic Republic of Algeria
وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education and Scientific Research
اللجنة البيداغوجية الوطنية لميدان العلوم و التكنولوجيا
National Pedagogical Committee for Science and Technology

مواءمة

عرض تكوين
ماسترأكاديمي

2017-2016

الميدان	الفرع	التخصص
علوم و تكنولوجيا	هندسة الطرائق	هندسة صيدلانية

I– Identity card of the Master

Access conditions

Sector	Harmonized master	Access Licenses at the masters	Classification according to license compatibility	Coefficient assigned to the license
Process Engineering	pharmaceutical engineering	Process Engineering	**1**	**1.00**
		Pharmaceutical Chemistry (Domain SM)	**2**	**0.80**
		Organic Chemistry (Domain SM)	**4**	**0.65**
		Energetic	**4**	**0.65**
		Other ST domain licenses	**5**	**0.60**

II – Half-yearly lesson organization sheets specialty

MASTER Pharmaceutical Engineering
Semester 1

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Assessment method	
	Entitled			Course	TD	TP			Continuous monitoring	Exam
Fundamental EU Code: UEF 1.1 Credits: 8 Coefficients: 4	Pharmaceutical Chemistry I: Structure and Design	4	2	1h30	1h30		45h00	55h00	40%	60%
	Pharmacology general	2	1	1h30			22h30	27h30	40%	60%
	Pharmacognosy	2	1	1h30			22h30	27h30	40%	60%
Fundamental EU Code: UEF 1.2 Credits: 10 Coefficients: 5	Fluid-Fluid Unit Operations (extraction, distillation, absorption and stripping)	6	3	3h00	1h30		67h30	82h30	40%	60%
	Heat Transfer and Heat Exchangers	4	2	1h30	1h30		45h00	55h00	40%	60%
Methodological Unit Code: EMU 1.1 Credits: 9 Coefficients: 5	Practical work Pharmaceutical chemistry, galenic forms and pharmacognosy	3	2			2h30	37h30	37h30	100%	
	Fluid-Fluid Unit Operations	2	1			1h30	22h30	27h30	100%	
	Practical work Thermal transfer and Heat exchangers	2	1			1h30	22h30	27h30	100%	
	Dosage forms	2	1	1h30			22h30	27h30	40%	60%
Discovery Teaching Unit Code: UED 1.1 Credits: 2,coef. :2	Course of choice	1	1	1h30			22h30	2h30	40%	60%
	Course of choice	1	1	1h30			22h30	2h30	40%	
Transversal UE Code: UET 1.1 Credits: 1, coef. : 1	Technical English and Terminology	1	1	1h30			22h30	2h30	40%	60%
Total semester 1		**30**	**17**	**15h00**	**4h30**	**5h30**	**375h00**	**375h00**		

Semester 2

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Assessment method	
	Entitled			Course	TD	TP			Continuous monitoring	Exam
Fundamental EU Code: UEF 1.2.1 Credits: 10 Coefficients: 5	Industrial production of drugs in dry form	4	2	3h00			45h00	55h00	40%	60%
	Pharmaceutical Chemistry II: Therapeutic Classes	2	1	1h30			22h30	27h30	40%	60%
	Medication analysis and control	4	2	1h30	1h30		45h00	55h00	40%	60%
Fundamental EU Code: UEF 1.2.2 Credits: 8 Coefficients: 4	Fluid-Solid Unit Operations(Crystallization, Centrifugation, Sedimentation, Filtration, Drying)	4	2	1h30	1h30		45h00	55h00	40%	60%
	Multiphase Reactors	4	2	1h30	1h30		45h00	55h00	40%	60%
Methodological Unit Code: EMU 1.2 Credits: 9 Coefficients: 5	Practical work Fluid-solid unit operations and multiphase reactors	2	1			1h30	22h30	27h30	100%	
	TP production of drugs in dry form	2	1			1h30	22h30	27h30	100%	
	Practical work Analysis and control of drugs	2	1			1h30	22h30	27h30	100%	
	Process Engineering Simulators	3	2	1h30		1h00	37h30	37h30	40%	100%
Discovery Teaching Unit Code: UED 1.2 Credits: 2 Coefficient: 2	Course of choice	1	1	1h30			22h30	2h30		100%
	Course of choice	1	1	1h30			22h30	2h30		100%

Transversal UE Code: UET 1.2 Credits: 1,Coef.1	Ethics, Deontology and Intellectual Property	1	1	1h30			22h30	2h30		100%
Total semester 2		**30**	**17**	**15h00**	**4h30**	**5h30**	**375h00**	**375h00**		

Semester 3

Teaching unit	Materials	Credits	Coefficient	Weekly hourly volume			Semester Hourly Volume (15 weeks)	Complementary work in Consultation (15 weeks)	Assessment method	
	Entitled			Course	TD	TP			Continuous monitoring	Exam
Fundamental EU Code: UEF 3.1 Credits: 10 Coefficients: 5	Production of drugs in liquid and paste forms	4	2	1h30	1h30		45h00	55h00	40%	60%
	Biopharmacy and Pharmacokinetics	4	2	3h00			45h00	55h00	40%	60%
	Sterilization and freeze-drying	2	1	1h30			22h30	27h30	40%	60%
Fundamental EU Code: UEF 3.2 Credits: 8 Coefficients: 4	Bioreactors	4	2	1h30	1h30		45h00	55h00	40%	60%
	Water production for pharmaceutical industries	4	2	1h30	1h30		45h00	55h00	40%	60%
Methodological Unit Code: EMU 3.1 Credits: 9 Coefficients: 5	Process regulation and control	2	1	1h30			22h30	27h30	100%	
	Plans of experiments	3	2	1h30		1h00	37h30	37h30	40%	60%
	Numerical analysis	4	2	1h30	1h30		45h00	55h00	40%	60%
Discovery Teaching Unit Code: UED 3.1 Credits: 2 Coefficients: 2	Course of choice	1	1	1h30			22h30	27h30	40%	60%
	Course of choice	1	1	1h30			22h30	27h30	40%	60%
Transversal UE Code: UET 3.1 Credits: 1	Documentary research and dissertation design	1	1	1h30			22h30	2h30	40%	60%

Coefficients: 1										
Total semester 3		**30**	**17**	**18h00**	**6h00**	**1h00**	**375h00**	**375h00**		

UE Discovery (S1, S2 and S3) of your choice according to the means of the establishment

1- *Management and business administration*
2- *Pharmaceutical regulation*
3- *Porous and dispersed media*
4- *Powder rheology*
5- *Process Optimization*
6- *Microbiological and Biochemical Engineering*
7- *Occupational Risks and Prevention*
8- *Biosecurity*
9- *Standardization*
10- *Properties and behavior of implant biomaterials, prostheses and orthoses.*
11- *Shaping and production of biomaterials by CAD-CAM.*
12- *Biopharmacy and Pharmacokinetics*
13- *Biosafety and bioethics in the pharmaceutical industry*
14- *The pharmaceutical industry: history, evolution and economic models*
15- *Drug delivery systems*
16- *Drugs of the future (nano-drugs, personalized medicine, etc.)*

Semester 4

Internship in a company sanctioned by a dissertation and a defence.

	VHS	coefficient	Credits
Personal work	550	09	18
Company internship	100	04	06
Seminars	50	02	03
Other (Framing)	50	02	03
Total Semester 4	750	17	30

This table is given for information only.

Evaluation of the End of Master Cycle Project

- Scientific value (Jury assessment) /6
- Dissertation writing (Jury assessment) /4
- Presentation and answer to questions (Jury assessment) /4
- Appreciation of the supervisor /3
- Presentation of the internship report (Jury assessment) /3

III - Detailed program by subject of semester S1

Semester: 1
Course Unit: UEF 1.1.1
Subject 1: Chemistry Pharmaceutical 1
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits:*4*
Coefficient :*2*

Teaching objectives:

Deepening of the basic notions of chemistry. Extension of these notions to the fundamental chemical principles governing drug behaviour in the body. This course is a link between organic and pharmaceutical chemistry.

Recommended prior knowledge:

Basic notions of general chemistry and organic chemistry

Material content:

Chap.1 Consolidation of basic notions on chemical bonding (4 weeks)

Atoms and interatomic cohesion forces, some modern aspects of chemical bonding: from Lewis to molecular orbital's, Weak intermolecular forces. Illustration of the nature of forces

Chap2. Heteraromatics (4 weeks)

2.1: Notion of aromaticity, Huckel's rule
2.2: Illustrations of some access routes
2.3: Case of 5-membered (thiophene, pyrrole, furan) and 6-membered (pyridine, quinoline, isoquinoline) aromatic heterocycles: Common pathways and reactivities, SE, SNAr
2.4: Some cases of polyheteroatomic heteroatoms

Chap.3 Notions of dynamic stereochemistry (4 weeks)

3.1 General (Elements of dynamic stereochemistry, Curtin-Hammet principle)
3.2 The different types of stereochemical inversion (Racemization, Epimerization)
3.3 Notions of stereoselective and stereospecific reactions
3.4 Asymmetric synthesis, asymmetric induction

i) From chiral molecules (hemisynthesis), ii) Using a chiral auxiliary, iii) Using a chiral reagent, iv) By enantioselective catalysis

Chap.4 Introduction to therapeutic chemistry (3 weeks)

i) fundamental principles of drug design, ii) structure-activity relationships and those between structure and physicochemical properties, iii) drug-target interactions including thermodynamic and kinetic concepts of binding and iv) drug metabolism.

Assessment method:

Continuous control: 40%; Exam: 60%.

References

1- *K. Peter C. Vollhardt, Neil E. Schore: Organic Chemistry, 4th Edition, Freeman and Co 2003*
2- *Jonathan Clayden, Nick Greeves, Stuart Warren, Peter Wothers: Organic Chemistry, Oxford University Press 2001*

3- *Graham L. Patrick: An introduction to Medicinal Chemistry, 2nd Edition, Oxford University Press 2001*
4- *Wermuth C.: The Practice of Medicinal Chemistry, Academic Press, 2nd Ed - 2003, 3rd Ed 2008.*
5- *G. Thomas: Medicinal Chemistry - An introduction, 2nd Ed - 2008.*
6- *Williams DA, Foye WO, Lemke TL: Foye's Principles of Medicinal Chemistry, Lippincott Williams & Wilkins, 2002.*
7- *Patrick GL: An Introduction to Medicinal Chemistry, Oxford University Press, 3rd Ed - 2005.*

Semester: 1
Course Unit: UEF 1.1.1
Material 2: General pharmacology
VHS: 22h30 (C: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:
At the end of this teaching entity, the student will have acquired knowledge of the fundamental concepts in pharmaco dynamics and pharmacotherapy. He will be able to define the main drug targets and understand the methods used to determine their activity. He will have acquired the fundamental notions governing the relationship between drugs and their targets. He will understand all the general notions relating to the use of drugs.

Recommended prior knowledge:
Basic notions of biochemistry and biology

Material content:

The teaching is based on the exploration of a large number of notions specific to pharmacology. Beyond a descriptive theoretical course, the notions are developed through concrete examples.

Chap1: Mechanisms of action of drugs (3 weeks)

Chap2: Quantitative study of the relationship between receptor binding and pharmacological response (3 weeks)

Basic notions on the identification, classification and regulation of receptors.

Chap3: General pharmacotherapy: (3 weeks)
therapeutic index; Tolerance and drug dependence; Adverse effects;

Chap4: Drug interactions (3 weeks)

Clinical evaluation of drugs: placebo effect, clinical trials.

Chap5: Systematic description of pharmacological targets at the molecular level and their implications in various pathophysiological processes.(3 weeks)

Assessment method:
Continuous control: 40%; Exam: 60%.

Bibliographic references: (If possible)

1. *Rang and Dale's Pharmacology, Rang HP, Elsevier, 8th edition (2015).*
2. *Basic and Clinical Pharmacology, BG Katzung, MacGraw-Hill Professional Publishing, 13th edition (2014).*
3. *Goodman and Gilman's The Pharmacological Basis of Therapeutics, L. Brunton et al. 12th edition (2011).*

Semester: 1
Course Unit: UEF 1.1.1
Matter 3: Pharmacognosy
VHS: 22h30 (C: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:
At the end of this course, students must - know the main raw materials of natural origin - know the main types of active principles of natural origin, their physico-chemical and pharmacological properties - understand the principles of the analysis techniques used to determine the quality of drugs of natural origin. The program of this master will cover the pharmacological properties of drugs of natural origin, the possible interactions, as well as the side effects. Concepts of biosynthesis for each chemical class will also be discussed. At the end of the course, examples will be presented illustrating the importance of chemotaxonomy and ethnopharmacology.

Recommended prior knowledge:
Basic notions of general chemistry

Material content:

Part A: General pharmacognosy (7 weeks)

- Main classes of active principles of natural origin, and Quality criteria for plants and plant extracts, methods for identifying or screening the main classes of active principles mentioned below.
- Biogenesis, physico-chemical and pharmacological properties of the main natural active ingredients

Part B: Special pharmacognosy. (8 weeks)

- General information about herbal medicine: its advantages and limitations as well as the risks and dangers associated with the uncontrolled use of plants
- Main forms of use of plants in pharmacy
- Most common plants used in pharmacy (parts used, chemical composition, quality criteria, pharmacological properties, main uses, side effects, contraindications, doses).

Assessment method:
Continuous monitoring: Exam: 100%.

Bibliographic references:

1- *Lu-qi Huang (auth.), Lu-qi Huang (eds.) MolecularPharmacognosy, SpringerNetherlands (2013).*
2- *Biren Shah, Avinash Seth, Textbook of Pharmacognosy and Phytochemistry, Elsevier (2012).*
3- *Michael Heinrich, Joanne Barnes, Simon Gibbons, Elizabeth M. Williamson, Fundamentals of Pharmacognosy and Phytotherapy, Churchill Livingstone, 2d Edition (2012).*

Semester: 1

Course unit: UEF 1.1.2
Material 1:Fluid-Fluid Unit Operations (extraction, distillation, absorption and stripping)
VHS: 67h30 (C: 3h00, TD: 1h30)
Credits: 6
Coefficient:3

Teaching objectives:

At the end of this course, the student should be able to:

- Master the separation techniques of Process Engineering (absorption, extraction and distillation).
- Address the notions of sizing and design of equipment.
- Know the main operating problems (priming, clogging, etc.).

Recommended prior knowledge:

Thermodynamics, Differential equations, Transfer phenomena (matter transfer, fluid mechanics,..).

Material content:

Chapter 1. Absorption and Stripping (5 weeks)

Liquid-gas equilibrium, Solubility of gases as a function of pressure and temperature. Mass and enthalpy balances. Equipment used continuously. Theoretical and real stage concepts, Mac Cabe and Thièle method, concept of transfer units, sizing of packed columns, pressure drop, clogging speed. Complete sizing of a column with plates (Diameter of the column, weir, active surface, diameter of the holes, space between plates, entrainment of the solvent (devisicular). Absorption with chemical reaction. Stripping (regeneration of the solvent).

Chapter 2.Liquid – Liquid Extraction (4 weeks)

Partition coefficient, selectivity, different types of diagrams. Equipment used continuously and discontinuously. Partially soluble solvent: co-current and counter-current multi-stage extraction (ternary diagram). Insoluble solvent: co-current and counter-current multi-stage extraction (Mac Cabe and Thièle construction), extraction with double feed, extraction with reflux. Stripping and recycling of the solvent, choice of the stripping phase And notion of efficiency.

Chapter 3.Distillation (6 weeks)

Assessment mode:

Continuous control: 40%; Exam: 60%.

Bibliographic references:

1. *Daniel Defives and Alexandre Rojey, Material transfer, Efficiency of chemical engineering separation operations, TECHNIP Edition, 1976.*
2. *Robert E. Treybal, "Mass Transfer Operations", Third Edition, McGraw-Hill, 1980.*
3. *Warren L. McCabe, Julian C. Smith, Peter Harriott "Unit Operations of Chemical Engineering", Mc Graw-Hill, Inc, Fifth Edition, 1993.*
4. *Jean LEYBROS, Liquid-liquid extraction - Description of devices, Engineering techniquesReference J2764 v1, 2004.*
5. *Unit Operations Handbook, Volume 1, Mass transfer, Edited by John J. Mcketta,*

1993.
6. Daniel Morvan, Chemical Engineering: Unit Operations Industrial Processes Course and Corrected Exercises, Publisher: ELLIPSES, Colletion: Technosup, 2009.
7. Pierre Wuithier, Petroleum, Refining and Chemical Engineering, 2nd edition, 1972.

VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 4
Coefficient:2

Teaching objectives:

Heat Transfer, being part of the transfer phenomena, deals with the transfer of energy between two media. This phenomenon is present in various industrial applications in the field of Process Engineering as well as in other branches. Its objective is to complete the knowledge of the students and to teach them new notions such as heat transfer in transient state, conduction through the fins and in the presence of a heat source as well as heat exchangers, and calculation methods for heat transfer equipment.

Recommended prior knowledge:

Heat transfer, fluid mechanics, notions of mathematics (first and second order differential equations, calculation of integrals, etc.).

Material content:

Chapter 1.Reminders of Heat Transfer Laws (1Week)

Chapter 2.Thermal Conduction(1Week)

Chapter 3.Thermal Convection (2 Weeks)

Chapter 4Description of Heat Exchange Devices without Phase Change . (2 weeks)

Double tube exchangers, Core and shell heat exchangers (shell, core and core-shell assembly) and Plate heat exchangers.

Chapter 5.Calculation of exchangers(3 weeks)

Study of heat transfer (fundamental equations, average temperature difference, global transfer coefficient U), Study of pressure drops (Load loss inside the tubes, Pressure drop outside the tubes), Methods of calculation (Calculation of a double-tube heat exchanger,Calculation of a bundle and shell heat exchanger (Kern method)),General considerations on the calculation of a bundle and shell device and programming of the calculation.

Chapter 6Heat Exchange Devices with Phase Change. (3 weeks)

Description of the devices, condensation of a pure vapor (Film coefficients for condensation outside the tubes, Calculation of the condenser, Condensation preceded by a desuperheating of the vapor and followed by the cooling of the condensate), Condensation of a complex vapor (Calculation of the own transfer coefficient (Ward method and Kern method), Pressure drop in the shell, Example of calculation), forced circulation flooded reboilers (Reboiling of a pure substance in the shell, Reboiling of a mixture in the shell), Level Reboilers with Natural Circulation, Flooded Reboilers with Natural Circulation, example of Calculation of a Reboiler.

Chapter 7.finned tubes(2 weeks)

1/ Integral low fins: Description, Efficiency, Overall heat exchanger transfer coefficient, Condensation film coefficient on horizontal finned tubes and Pressure drop.
2/High fins: Description and study of air coolers.

Assessment mode:

Continuous control: 40%; Exam: 60%.

Bibliographic references:

1. *JF Sacadura, Thermal transfers – Initiation and deepening, Ed. Lavoisier, 2015.*
2. *RB Bird, WE Stewart, EN Lightfoot, Transport phenomena, 2nd Ed., Wiley & Sons, 2007. A. Giovannini and B. Bédat, Heat transfer, Ed. Cépaduès, 2012.*
3. *James R. Welty, Charkes E. Qicks, Robert E. Wilson; Gregory Rorrer, Fundamentals of Momentum, Heat, and Mass Transfer. 4th edition Wiley & Sons, 2001.*
4. *Leontiev, Theory of heat and mass exchanges – Mir-Moscow edition*
5. *HW Mac Addams The transmission of heat - Dunod - Paris*
6. *FP Incropera, DP Dewitt - Fundamentals of Heat and Mass Transfer - Wiley, NY - 2002*
7. *Bontemps, A. Garrigue, C. Goubier, J. Huetz, C. Marvillet, P. Mercier And R. Vidil – Heat exchanger – Engineering Techniques, Treatise on Energy Engineering*
8. *P. Wuithier, Petroleum, Refining and Chemical Engineering volume 2, Edition technip Paris*

Semester: 1
Course unit: UEM1.1
Material 1: Pharmaceutical Chemistry 1
VHS: 22h30 (TP: 1h30)
Credits: 2
Coefficient: 1

Teaching objectives:

To familiarize the student with the methods of synthesis on a laboratory scale and also to know the principles of purifications and separations after isolation of the prepared compounds.

Recommended prior knowledge:
Principles of organic chemistry and pharmaceutical chemistry, and separation methods in general

Material content:
TP 1: Learning separation methods
(Liquid-liquid extraction, fractional distillation),

TP 2: Learning purification methods
(Recrystallization, distillation),

TP 3: Learning characterization methods
(melting and boiling points, refractive index, chromatography),

TP4: Learning structural identification methods (NMR and IR spectroscopy, chemical tests).

TP 5: Introduction to functional analysis and synthesis.

NB: These techniques are implemented using aromatic compounds

Assessment mode:
Continuous control: 100%.

Bibliography

1- *Daniel R. Palleros: Experimental Organic Chemistry John Wiley and Sons 2000*
2- *Donald L. Pavia et al: Introduction to Organic Laboratory Techniques, 4th Edition, Brooks/Cole 2007*
3- *Shriner, Hermann, Morrill, Curtin, Fuson: The Systematic Identification of Organic Compounds, 7th Edition, Wiley and Sons 1998*
4- *Graham L. Patrick: An introduction to Medicinal Chemistry, 2nd Edition, Oxford University Press 2001*

Semester: 1
Course unit: UEM1.1
Subject 2: Practical work Unit operations(Fluid-Fluid)
VHS: 22h30 (TP:1h30)
Credits: 2
Coefficient:1

Teaching objectives:

- Allow the student to apply the theoretical knowledge acquired on a practical level and to visualize certain phenomena.
- know how to workas a team, respect the safety rules and control the risks associated with equipment, installations and processes.

Recommended prior knowledge:

Thermodynamics, transfer phenomena (matter transfer, fluid mechanics, etc.).

Material content:

Practical work N° 1. Determination of the mutual solubility of two partially miscible liquids, water-phenol.

TP No. 2. .Eextraction of volatile molecules by hydrodistillation.

TP No. 3.Separation of benzoic acid and 2-naphthol

TP No. 4.Study of a batch liquid-liquid extraction process.

Practical work N° 5. Study of some phase diagrams.

TP No. 6. Aabsorption of the CO2 contained in an air flow by water ("physical absorption").

TP No. 7.Absorption with chemical reaction and solvent regeneration: absorption of CO2 in amino acids.

TP No. 8. Aabsorption liquid-gas desorption.

TP No. 9.Realization of a water/oil/surfactant ternary diagram.

TP No. 10.Study of the operation of the column in total reflux

TP N° 11. Continuous rectification.

TP N° 12. Discontinuous distillation.

TP No. 13.Study of a continuous distillation process in a packed column or in a column with perforated plates.

TP No. 14.Separation and purification by fractional distillation: Case of esterification.

NB:
6 practical exercises to be carried out at least according to the means available

Assessment mode:

Continuous control: 100%.

Semester: 1
Course unit: UEM1.1
Material 3: TP Thermal transfer and Heat exchangers
VHS: 15h00.
Credits: 1
Coefficient: 1

Teaching objectives:

- Experimentally quantify the various modes of heat transfer.
- Measure the thermal performance of different types of exchangers.
- Experimentally study equipment for the production, transport and use of steam.

Recommended prior knowledge:

Transfer phenomena, fluid mechanics.

Material content:

TP No. 1.Heat transmission by conduction (basic unit).

TP No. 2.Linear heat conduction.

TP No. 3.Radial heat conduction.

TP No. 4.Convection and radiation

TP No. 5.Heat transmission by free and forced convection.

TP No. 6.Coaxial heat exchanger.

TP No. 7.Plate heat exchanger: enthalpy balances, efficiency curves, evaluation of transfer coefficients.

TP No. 8.Tube bundle heat exchanger.

Assessment mode:

Continuous control: 100%.

Semester: 1

Course unit: UEM1.1
Material 4: Dosage Forms
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:
The objective of this subject is to know the various pharmaceutical forms.

Recommended prior knowledge:

Material content:
Chapter 1: General (1 week)
- Definition, purpose, galenic formula, composition, excipient with known effect

Chapter 2: Powders, Granules and tablets (2 weeks)
- Powdered substances for pharmaceutical use - Evaluation of functionality
- Granules and granulation
- Tablets: study of physicochemical parameters of tablets, granulation, drying and processing of granules, compression machines, Testing and storage of tablets, uncoated tablets, tablets coated with a membrane and film - Modified-release tablets: accelerated-release tablets, tablets delayed-release, extended-release tablets

Chapter 3: Capsules – Soft capsules and biopharmaceutical control of solid oral forms (1 week)
- Capsules with hard shells or gelatin capsules
- Soft capsules
- Controls for capsules and soft capsules
- Biopharmaceutical control of solid oral forms

Chapter 4: Solutions, suspensions and emulsions for oral, parenteral and ophthalmic routes (2 weeks)
- Solutions
- pendant lights
- Emulsions
- Dry emulsions
- Liquid preparations for oral use
- Parenteral preparations
- Ophthalmic forms

Chapter 5: Preparations for inhalation (2 weeks)
- Respiratory Tract – Anatomy and Physiology
- Liquid preparations for inhalation
- Powders for inhalation
- Pharmacotechnical testing of inhalation preparations

Chapter 6: Dosage forms applied to the skin – suppositories (2 weeks)
- Dosage forms applied to the skin
- suppositories

Chapter 7: Spheroids and vectorized shapes (1 week)
- Microparticles
- Nanoparticles
- Liposomes

Chapter 8: Dosage forms in development (2 weeks)

- Bioencapsulation
- Implants
- Mesoporous materials of pharmaceutical interest
- Bioadhesive forms
- Iontophoresis
- Colloidal systems of cyclodextrins

Chapter 9: Packaging of drugs (2 weeks)

Assessment method:

Continuous control: 40%; Exam: 60%.

Bibliographic references: (If possible)

1- *Marie-Ange Dalmasso, Olivier Allo, Pascale Blanc, Galenic Pharmacy BP, Les Editions Porphyre (2013).*
2- *Pascal Wehrlé, Galenic pharmacy: formulation and pharmaceutical technology, Edition Maloine (2012).*

Semester: 1
Course unit: UED1.1
Material 1: Environmental Microbiology and Biochemistry
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 2
Coefficient:2

Teaching objectives:
Acquire fundamental knowledge of microbiology and environmental biochemistry.

Recommended prior knowledge:
Basic notions of natural sciences

Material content:

Part One – MICROBIOLOGY ***8 weeks***

I-INTRODUCTION TO ENVIRONMENTAL MICROBIOLOGY
II-MORPHOLOGY AND FUNCTIONAL ANATOMY OF BACTERIA
III-BACTERIAL PHYSIOLOGY
- a)-Nutrition
- b)-Growth

IV-ROLE OF MICRO-ORGANISMS IN THE CYCLE OF BIO-ELEMENTS
- a)-Characteristics of microbial ecosystems.
- b)-Soil microbiology
- c)-Microbiology of aquatic environments.
- d)-Microbiology of the air.

V-MICROBIOLOGY OF THE AIR OF DOMESTIC WATER AND WASTE WATER.

Second Part - BIOCHEMISTRY ***7 weeks***

I-Introduction
- a)-Molecular constituents of the cell.
- b)-Notions of bioenergetics.

II- Proteins
- a)-Structure and properties of amino acids.
- b)-Structure and properties of proteins.

III- Enzymology
- a)-Structure and mechanism of action of enzymes
- b)-Complements of enzymatic kinetics
- c)-Introduction to the enzyme genus.

IV- Microbial degradation of proteins
- Nitrogen and sulfur cycle

V-Carbohydrates
- a)-Structure and properties of monosaccharides.
- b)-Structure and properties of carbohydrates
- c)-Microbial degradation of cellulosic waste and the carbon cycle.
- d)-The transport of electrons and the cycle of phosphorus, oxygen.

VI-Lipids
- a)-Structure and properties of fatty acids.

b)-Structure and properties of lipids.
c)-Microbial degradation of petroleum residues, n-alkanes for example

Assessment method:
Continuous control: 40%; Exam: 60%.

Bibliographic references: (If possible)

1. *Pauline M. Doran, Bioprocess Engineering Principles, Academic Press, 2nd edition, 2013*
2. *KG Clarke, Bioprocess Engineering, Elsevier, 2013.*

Semester: 1
Course unit: UET 1.1
Material 1: Technical English and Terminology
VHS: 22h30 (C: 1h30)
Credits: 1
Coefficient: 1

Teaching objectives:

To introduce the student to technical vocabulary. Strengthen your knowledge of the language. Help him at understand and synthesize a technical document. Enable him to understand a conversation in English held in a scientific setting.

Recommended prior knowledge:

Vocabulary and basic grammar in English

Material content:

- Written comprehension : Reading and analysis of texts related to the specialty.

- Oral comprehension: From authentic video documents of scientific popularization,taking notes, summarizing and presenting the document.

- Oral expression: Presentation of a scientific or technical subject,elaboration and exchange of oral messages (ideas and data), Telephone communication, Gestural expression.

- Written expression : Extraction of ideas from a scientific document, Writing of a scientific message, Exchange of information in writing,CV writing, application letters for internships or jobs.

Recommendation :It is strongly recommended that the person in charge of the subject present and explain at the end of each session (at most) about ten technical words of the specialty in the three languages (if possible): English, French and Arabic.

Assessment mode:

Exam: 100%.

Bibliographic references:

1. *PT Danison, Practical guide to writing in English: customs and rules, practical advice, Editions d'Organisation 2007*
2. *A. Chamberlain, R. Steele, Practical Guide to Communication: English, Didier 1992*
3. *R. Ernst, Dictionary of techniques and applied sciences: French-English, Dunod 2002.*
4. *J. Comfort, S. Hick, and A. Savage, Basic Technical English, Oxford University Press, 1980*

III - Detailed program by subject of semester S2

Semester: 2
Course Unit: UEF 1.2.1
Subject 1: Industrial production of drugs in dry form
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 4
Coefficient:2

Teaching objectives:

The student will assimilate the fundamental notions of the formulation and production of solid pharmaceutical forms. Thus, we will approach the different industrial steps that lead to the manufacture of dry forms of drugs. The student must be able to understand the mechanisms involved in the production of dry forms and the operation of the equipment.

Recommended prior knowledge:

Pharmaceutical processes

Material content:

Chapter 1: Art of dry forms (1 week)

Reminder of dry dosage forms; Manufacturing processes for sachets, capsules and tablets

Chapter 2: Grinding (1 week)

General, particle size; grinding modes; Crushing devices; Particle size control of powders

Chapter 3: Mixing pharmaceutical powders (2 weeks)

The mixing of powders; Interest in the pharmaceutical industry; Principle of mixing and unmixing powders; Powder mixing factors; Randomized (random) shuffling and Structured (ordered) shuffling; Equipment (cubic mixer, V, etc.); Controls (dosage, calculation of the mean, variance, coefficient of variation, etc.)

Chapter 3: The granulation process of pharmaceutical powders (3 weeks)

Wetting phenomenon; Forces involved; Growth and consolidation of granules (pendulum, funicular, capillary, gout state); Constraint and breakage of granules; Equipment (High Shear, fluidized bed, etc.); Controls (dosage, flow, volume meter, etc.)

Chapter 4: Fluidized air bed drying of pharmaceutical granules (4 weeks)

Fluidization theory (hydrodynamics, minimum fluidization velocity, terminal velocity of fall, Darcy's law, Ergun's law, Geldart diagram, etc…); Principle of fluidized bed drying; Heat transfer modes; Drying stages (drying speed, constant speed, decreasing speed, etc.); Air parameters (adsorption isotherm, Mollier diagram, etc.); Control (dosage, humidity, etc.)

Chapter 5: The compression of pharmaceutical powders (3 weeks)

Description of the presses (rotary, alternative); Compression cycle; Densification models (Heckel, etc…); Control of tablets (hardness, friability, disintegration, dissolution, etc.); Establishment of control cards

Chapter 6: Coating of medicinal tablets (1 week)

Interest of lamination and coating; Principle of operation; Spraying of the coating solution (calculation of the size of the drops, surface of projection, etc…): Control of the tablets (hardness, friability, disintegration, dissolution, etc…)

Assessment mode: Continuous control: 40%; Exam: 60%.

Bibliographic references:

Galenic pharmacy. Formulation and pharmaceutical technology. P.Wehle

Semester: 2
Course Unit: UEF 1.2.1
Subject2: Pharmaceutical Chemistry II: Therapeutic Classes
VHS: 22h30 (C: 1h30)
Credits: 2
Coefficient:1

Teaching objectives:

The aim is to provide the student with the appropriate knowledge to understand the physico-chemical characteristics of bioactive molecules, their methods of obtaining as well as the main therapeutic uses.

Recommended prior knowledge:

General chemistry and organic chemistry

Material content:

1. Introduction to the drug
2. Origins of medicinal substances
   - Medicines of plant origin: aromatherapy, phytotherapy, etc.
   - Drugs of animal origin: organ-based drugs, blood-derived drugs
   - Medicines derived from biotechnology: vaccines, antibiotic therapy, etc.
   - Drugs resulting from chemical synthesis or inorganic drugs: Some examples of therapeutic classes of major interest:

   - CNS (central nervous system) drugs
     carbonic acid, urea and derivatives, barbiturates, hydantoin and antiepileptics, phenothiazines and neuroleptics
   - Amino-alcohols
     Simple amino alcohols, atropine and derivatives, local anesthetics catetholamines, ephedrine and amphetamines
   - Antibiotics
     beta---lactams, chloramphenicol, aminoglycosides, tetracyclines, macrolides
   - Sulfonamides
     bacteriostatic sulfonamides, hypoglycaemic sulfonamides, diuretic sulfonamides
   - Anti inflammatory
   - vitamins
   - Cardiovascular drugs

Assessment mode: Continuous control: 40%; Exam: 60%.

Bibliographic references:

Semester: 2
Course Unit: UEF 1.2.1
Topic3: Drug Analysis and Control
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 4
Coefficient:2

Teaching objectives:

Recommended prior knowledge:

Material content:

Chapter 1:**(2 weeks)**

General framework for drug analysis and control

Definitions of basic concepts (drug, analysis, control, counterfeiting of drugs, quality, stability of drugs); Main sources of contamination or alteration of medicines; Main standards (pharmacopoeias, ICH guidelines, GMPs); General organization of drug control systems (national and international actors, challenges posed by international trade and counterfeit drugs, etc.); Examples of active ingredient monographs

Chapter 2:**(2 weeks)**

Main elements of an analytical strategy

Characterization of an analysis problem (questions to be asked in order to design an analysis strategy, aspects related to the type of drug (complex mixtures, synthetic PA, etc.), aspects related to sampling, etc.); Analyzing the performance of an analytical technique; Analytical purposes in the pharmaceutical field (identification, dosage, search for impurities); Analytical approach for the identification of a pharmaceutical substance (organoleptic analysis, physico-chemical constants (temperatures of change of physical state (melting/boiling point…), solubility, optical rotation, chemical indices, refractive index…..); Analytical approach for the dosage of a pharmaceutical substance (pure substances, complex mixtures, etc.); Analytical approach for the search for impurities (main types of impurities, raw materials,

Chapter 3:(4 weeks)

Introduction to the main categories of analytical techniques

Reminders on chromatographic techniques; Reminders on spectral techniques (IR, UV-Vis, mass spectrometry, atomic absorption); Spectral techniques (NMR, tandem mass spectrometry (MS-MS), inductively coupled plasma mass spectrometry (ICP-MS), Raman spectroscopy, etc.); Classical titrimetric techniques (titration by precipitation (argentometry or argentometry), acid-base titration (protometry in aqueous and non-aqueous media), titration by formation of complexes (complexometry), titration by oxidation-reduction reactions (electrochemical methods))

Chapter 4:(***4 weeks***)

Drug quality control testing: identification testing, stability testing, dosage form quality control testing, microbiological quality control testing, specific testing for biotech drugs, sterile drugs and chiral drugs, Controls of packaging materials: Tests of packaging materials

(identification, mechanical tests, chemical resistance tests, transparency tests, permeability tests, conservation tests, innocuousness tests).

Chapter 5:**(3 weeks)**

Basic notions of the pharmaceutical quality system, risk management, quality by design (ICH regulatory requirements), Validation of analysis methods and qualification of equipment, constitution of the MA application file

1. *Tranchant, Handbook of Gas Chromatography, Masson, Paris 1995.*
2. *Modern instrumental methods and techniques, F. Rouessac and A. Rouessac, Dunod, Paris 2004*
3. *Principles of Instrumental Analysis, Douglas ArvidSkoog, F. James Holler, Timothy A. Nieman*
4. *Practical analysis of medicine, Dominique Pradeau*

Semester: 2
Course Unit: UEF 1.2.2
Subject 2: POLY-PHASIC REACTORS
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 4
Coefficient:2

Teaching objectives:

The student will have acquired knowledge concerning the operation of heterogeneous poly-phase reactors such as absorbers, catalytic reactors, combustion reactors and other heterogeneous two-phase reactors.

Recommended prior knowledge:

Basic knowledge of homogeneous reactors, chemical kinetics and transfer phenomena is recommended.

Material content:

Chapter 1. Two-phase fluid-fluid reactors (6 Weeks)

Introduction ; -Effect of the chemical reaction on the transfer of matter (Theory of the two films; Pseudo first order reaction-Hatta number (Ha); Fast reaction regime-Acceleration factor E; Instantaneous reaction regime; -Diagram E in function of Ha.); -Calculations of two-phase reactors (batch reactors, piston reactors, perfectly stirred continuous reactors.

Chapter 2. Catalytic Fluid-Solid Reactors (6 Weeks)

1- Intra-particle diffusion (Number of Thièle; Efficiency).
2- Efficiency and transfer of external matter (Effect of the diameter of the catalyst grain; Transfer of external matter).
3- Influence of internal diffusion on the reaction (Weisz-Prater criterion); Influence of external mass transfer on the reaction (Mears criterion).
4- Fixed bed reactors. ; Fluidized bed reactors.

Chapter 3. Non-Catalytic Fluid-Solid Reactors (3 Weeks)

Shrinkingcore sphere model.

Assessment mode: Continuous control: 40%; Exam: 60%.

Bibliographic references:

1. *Roustan M: Gas/liquid transfer in water and gaseous effluent treatment processes, Tec § Doc Lavoisier, Paris (2003) ISBN: 2-7430-0605-6*
2. *Schweich D: chemical reaction genius, Tec! Doc lavoisier (2001) ISBN: 2-7430-0459-2*
3. *R.Missen, C.Mims and B.Saville: Chemical reactions engineering and kinetics, John Wiley and Sons, new York (1999)*
4. *Levinspiel O: chemicalreaction engineering, 3rd edition, John Wiley and Sons, New York (1998) ISBN: 0471225424X*
5. *Villermaux J: Chemical reaction engineering, design and operation of reactors, 2nd edition, Tec § Doc Lavoisier, Paris (1993) ISBN: 2-85206-132-5*
6. *Atkinson B and Mayituna F: Biochemical engineering and biotechnology hand book, Ed Mac Millan (1991) ISBN: 978-033342-4032*
7. *Froment G and Bischoff KB: Chemical reactor, analysis and design: John Wiley and Sons, New York (1979)*

Semester: 2
Course Unit: UEF 1.2.2
Subject 1: Fluid-Solid Unit Operations
VHS: 45h00 (C: 1h30, TD: 1h30)
Credits: 4
Coefficient: 2

Teaching objectives:

At the end of this module, the student will have acquired the knowledge necessary to understand the phenomena of simultaneous transfer of matter and heat and to size certain equipment.

Recommended prior knowledge:

Knowledge of transfer phenomena (matter, quantity of movement and heat), thermodynamics, mathematics and notions of unit operations.

Material content:

Chapter 1.Crystallization (3 weeks)

Some fundamental aspects. The different stages of crystallization. Effect of impurities on crystal formation. Crystallization reactors (Batch and continuous). Adsorption of a solute in the liquid phase in a fixed-bed tower (percolation).

Chapter 2. Centrifugation(3 weeks)

Shape of the free surface of the liquid; Centrifugal pressure; Separation of immiscible liquids of different densities; Sedimentation in a centrifugal field; Filtration in a centrifuge, Sizing, Centrifugation equipment

Chapter 3. Sedimentation(3 weeks)

Sedimentation of fine particles. Sedimentation of large particles. Kynch's theory. Sizing of a decanter.

Chapter 4. Filtering(3 weeks)

Filter theory. Filtration at constant flow, at constant pressure. Ruth's law. Case of squeezable cakes.

Chapter 5. Drying (3 weeks)

General; Different types of dryers; Choice of dryers; Drying mode (continuous, discontinuous, counter-current, co-current, by convection, conduction, etc.); Drying mechanisms; Material and enthalpy balance at the level of a dryer; Calculation of drying speed and duration.

Assessment mode: Continuous control: 40%; Exam: 60%.

Bibliographic references

1. Coulson JM, JF Richardson, JR Backhurst And JH Harker, "Chemical Engineering", volume two, Fifth edition, Pergamon Press, 2002.
2. Rhodes, M., Introduction to ParticleTechnology, 2nd Ed., Wiley (2008).
3. Gibilaro, LG, Fluidization-Dynamics, Butterworth-Heinemann (2001).
4. Perry RH, DW Green And JO Maloney, "Perry's Chemical Engineers' Handbook " seventh edition, , McGraw Hill, 1999
5. Kunii D. And O. Levenspiel, "Fluidization Engineering", second ed. Butterworth-Heinemann, 1991.
6. Darton RC, "Fluidization", ed. by JF Davidson, R. Clift and D. Harrison, Academic Press, 1985.
7. McCabe WL, JC Smith and P. Harriott, "Unit Operations of Chemical Engineering", seventh edition, ed. McGraw Hill, 2004

Semester: 2
Course Unit: EMU 1.2.1
Subject 1: Practical work Fluid-solid unit operations and Multiphase reactors
VHS: 22h30 (TP: 1h30)
Credits: 2
Coefficient:1

Teaching objectives:

The student will have acquired knowledge concerning the operation of heterogeneous poly-phase reactors such as absorbers, catalytic reactors, combustion reactors and other heterogeneous two-phase reactors.

Recommended prior knowledge:

Basic knowledge of homogeneous reactors, chemical kinetics and transfer phenomena is recommended.

Content of the subject

Unit Operations

TP- Crystallization
lab- centrifugation
TP- sedimentation
TP - Filtration
TP-Drying

Multiphase reactors

NB: At least five (5) practical exercises in unit operations and two (2) practical works in reactors are provided according to the means available, the teaching teams can adopt other practical works if necessary with the agreement of the scientific and educational bodies.

Semester: 2
Course unit: EMU 1.2
Material 2: TP Production of drugs in dry form
VHS: 22h30 (TP: 1h30)
Credits: 2
Coefficient:1

Teaching objectives:

The student will have acquired knowledge concerning the operation of heterogeneous poly-phase reactors such as absorbers, catalytic reactors, combustion reactors and other heterogeneous two-phase reactors.

Recommended prior knowledge:

Basic knowledge of homogeneous reactors, chemical kinetics and transfer phenomena is recommended.

Content of the subject

- Mixing powders
- Granulation of powders
- Capsule Formulation
- Formulation of tablets
- Spray drying

NB: At least five (5) practicals are provided according to the means available, the educational teams can adopt other practicals if necessary with the agreement of the scientific and educational authorities.

Semester: 2
Course unit: EMU 1.2
Subject 3: TP Analysis and control of drugs
VHS: 22h30 (TP: 1h30)
Credits: 2
Coefficient:1

Teaching objectives:

The student will have acquired knowledge concerning the operation of heterogeneous poly-phase reactors such as absorbers, catalytic reactors, combustion reactors and other heterogeneous two-phase reactors.

Recommended prior knowledge:

Basic knowledge of homogeneous reactors, chemical kinetics and transfer phenomena is recommended.

Content of the subject

- Dosage of a drug by the volumetric method
- Dosage of a drug by spectrophotometry
- Pharmaco-technical control of tablets
- Dissolution
- Analysis of paracetamol (or an active ingredient) by thin layer chromatography
- pHmetric assay of aspirin
- Dosage by HPLC of a drug
- Demonstration of an excipient

Dosage of an active ingredient (ibuprofen) in a drug

NB: At least five (5) TPs are provided according to the means available, the teaching teams can adopt other TPs if necessary with the agreement of the scientific and pedagogical authorities

Semester: 2
Course unit: EMU 1.2
Subject 4: Process Engineering Simulators
VHS: 37h30 (C: 1h30, Lab: 1h00)
Credits: 3
Coefficient: 2

Teaching objectives:

Through this subject, the student learns to design, size and simulate certain industrial processes related to process engineering using a computer code in the form of a simulator. The program will be adapted according to the simulator used.

Recommended prior knowledge:

Thermodynamics, transfer phenomena, unit operations

Material content:

Chap. I: Booster (2 weeks)

Simulators in Process Engineering, creation of a simulation, selection of the list of compounds, choice of the thermodynamic model, installation and specification of material flows, simulation of pumps, compressors and flash separator.

Chap. II: Simulation of reactions and chemical reactors/bioreactors (3 weeks)

Single Conversion Reactions, Multiple Conversion Reactions, Balanced Reactions, Perfectly Stirred Reactors (PRPAC), Plug-In Reactors (RP), Bioreactors, Catalytic Reactors, and Association of Reactors.

Chap. III: Simulation of gas-liquid, liquid-liquid and liquid-solid contactors (3 weeks)

Simulation of absorption/stripping phenomena with and without chemical reactions in columns of different configurations (plates and packing), liquid-liquid and liquid-solid extraction.

Chap. IV: Simulation of distillation columns (3 weeks)

Distillation of binary and complex mixtures in columns of different configurations (Column with trays and packings with total and partial reflux and total and partial condenser).

Chap. V: Simulation of real processes (4 weeks)

Applications to real chemical, pharmaceutical and environmental processes (according to orientation)

Assessment method: Continuous control: 40%; Exam: 60%.

Bibliographic references:

1- Mariano Martín Martín, Introduction to Software for ChemicalEngineers, 2014.
2- Xavier Julia, Process simulators, engineering techniques, J1022 V2.
3- User guide of the simulator used.

Semester: 2
Course unit: UET 1.2
Subject: Ethics, deontology and intellectual property
VHS: 22h30 (C: 1H30)
Credit: 1
Coefficient: 1

Teaching objectives:

Develop student awareness of ethical principles. Introduce them to the rules that govern life at the university (their rights and obligations vis-à-vis the university community) and in the world of work. Make them aware of the respect and valuation of intellectual property.Explain to them the risks of moral evils such as corruption and how to combat them.

Recommended prior knowledge:

None

Material content:

A- Ethics and deontology

I. Notions of Ethics and Deontology (3 weeks)

1. Introduction
   1.Definitions: Morality, ethics, deontology
   2.Distinction between ethics and deontology
2. Charter of ethics and deontology of the MESRS: Integrity and honesty. Academic freedom. Mutual respect. Requirement of scientific truth, objectivity and critical thinking. Equity.Rights andobligationsof the student,teacher, administrative and technical staff.
3. Ethics and deontology in the world of work
   Legal confidentiality in business. Loyalty to the company. Responsibility within the company, Conflicts of interest. Integrity (corruption in the workplace, its forms, its consequences, methods of combating and sanctions against corruption)

II. Integral and responsible research (3 weeks)

1. Respect for the principles of ethics in teaching and research
2. Responsibilities in teamwork: Professional equality of treatment. Conduct against discrimination.The search for the general interest.Inappropriate conduct in the context of collective work
3. Adopting responsible conduct and combating excesses: Adopting responsible conduct in research. Scientific fraud. Conduct against fraud. Plagiarism (definition of plagiarism, different forms of plagiarism, procedures to avoid unintentional plagiarism, detection of plagiarism, sanctions against plagiarists, etc.). Falsification and fabrication of data.

B- Intellectual Property

I- Fundamentals of intellectual property (1 weeks)

1. Industrial property.Literary and artistic property.
2. Rules for citing references (books, scientific articles, communications in a congress, theses, dissertations, …)

II- Copyright (5 weeks)

1. Copyright in the digital environment

Introduction. Copyrightdatabases, software copyright. Specific case of free software.

2. Copyright in the internet and e-commerce

Domain name rights. Intellectual property on the internet. Law of the e-commerce site. Intellectual property and social networks.

3. Patent

Definition. Rightsin a patent. Usefulness of a patent. Therepatentability. patent applicationin Algeria and in the world.

4. Trademarks, designs and models

Definition. Trademark Law. Design law.Denomination of origin.The secret. Therecounterfeit.

5. Geographical Indications Law

Definitions. Protection of Geographical Indications in Algeria. International Treaties on Geographical Indications.

III- Protection and enhancement of intellectual property (3 weeks)

How to protect intellectual property. Violation of rights and legal tool. Vleveraging intellectual property. Protection of intellectual propertyin Algeria.

Assessment method:

Exam: 100%

Bibliographic references:

1. Charter of Ethics and University Deontology,https://www.mesrs.dz/documents/12221/26200/Charte+fran__ais+d__f.pdf/50d6de61-aabd-4829-84b3-8302b790bdce
2. Orders No. 933 of July 28, 2016 setting the rules relating to the prevention and fight against plagiarism
3. The ABCs of Copyright, United Nations Educational, Scientific and Cultural Organization (UNESCO)
4. E. Prairat, On teacher ethics. Paris, PUF, 2009.
5. Racine L., Legault GA, Bégin, L., Ethics and Engineering, Montreal, McGraw Hill, 1991.
6. Siroux, D., Deontology: Dictionary of Ethics and Moral Philosophy, Paris, Quadrige, 2004, p. 474-477.
7. Medina Y., Ethics, what will change in the company, editions of Organization, 2003.
8. Didier Ch., Thinking the ethics of engineers, Presses Universitaires de France, 2008.
9. Gavarini L. and Ottavi D., Editorial. of professional ethics in training and research, Research and training, 52 | 2006, 5-11.
10. Caré C., Morality, ethics, deontology. Administration and education, 2nd quarter 2002, n°94.
11. Jacquet-Francillon, Francois. Concept: professional ethics. Le Télémaque, May 2000, n° 17
12. Carr, D. Professionalism and Ethics in Teaching. New York, NY Routledge. 2000.

13. Galloux, JC, Industrial Property Law. Dalloz 2003.
14. Wagret F. and JM., Patents, trademarks and industrial property. PUF 2001
15. Dekermadec, Y., Innovating through patents: a revolution with the internet. 1999
16. AEUTBM. The engineer at the heart of innovation. Belfort-Montbeliard University of Technology
17. Fanny Rinck and Léda Mansour, literacy in the digital age: copy-paste among students, Université Grenoble 3 and Université Paris-Ouest Nanterre la Défense Nanterre, France
18. Didier DUGUEST IEMN, Citing your sources, IAE Nantes 2008
19. Similarity detection software: a solution to electronic plagiarism? Report of the Working Group on electronic plagiarism presented to the CREPUQ Sub-Committee on Pedagogy and ICT
20. Emanuela Chiriac, Monique Filiatrault and André Régimbald, Student Guide: Intellectual Integrity Plagiarism, Cheating and Fraud… Avoiding Them and, Above All, How to Cite Sources Properly, 2014.
21. Publication of the University of Montreal, Plagiarism prevention strategies, Integrity, fraud and plagiarism, 2010.
22. Pierrick Malissard, Intellectual property: origin and evolution, 2010.
23. The website of the World Intellectual Property Organizationwww.wipo.int
24. http://www.app.asso.fr/