الجمهورية الجزائرية الديمقراطية الشعبية

PEOPLE'S DEMOCRATIC REPUBLIC OF ALGERIA

MINISTRY OF HIGHER EDUCATION
AND SCIENTIFIC RESEARCH

Canvas of Setting in Conformity

TRAINING OFFER

L.M.D.

ACADEMIC LICENSE

First year common base (L1)

Domain: Sciences of Matter (SM)

Establishment	Faculty	Department
University of Biskra	Faculty of Exact Sciences Natural and Life Sciences	Material Sciences

الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي و البحث العلمي

نموذج مطابقة
عرض تكوين
ل. م . د
ليسانس أكاديمية

البرنامج البيداغوجي
للتعليم القاعدي المشترك
السنة الأولى - L1
ميدان علوم المادة (SM)

المؤسسة	الكلية/ المعهد	القسم
جامعة محمد خيضر بسكرة	كلية العلوم الدقيقة و علوم الطبيعة و الحياة	قسم علوم المادة

Contents

Semestriel teaching organization sheets
First year common base (L1)

Abbreviations:

TU :	Teaching Unit
FTU:	Fundamental Teaching Unit
MTU:	Methodology Teaching Unit
DTU:	Discovery Teaching Unit
TTU:	Transversal Teaching Unit
C :	Course
SHV:	Semestriel Hourly Volume
WHV:	Weekly Hourly Volume
PW(TP):	Practical Work
TS (TD) :	Tutorial series

1- Semester 1

Teaching units	Course Number	SHV	WHV			Other*	Coeff.	Credits	Evaluation mode	
		14-16 weeks	Lc	TS	PW	(14-16 weeks)			Continues	Exam
Fundamental Teaching units (FTU)										
FTU11		**202h30**	**9h00**	**4h30**			**9**	**18**	**33**	**67**
Mathematics 1/ Analysis & Algebra 1	F111	67h30	3h00	1h30	-	82h30	3	6	**33**	**67**
Physics 1/ Point mechanics	F112	67h30	3h00	1h30	-	82h30	3	6	**33**	**67**
Chemistry 1 / Structure of matter	F113	67h30	3h00	1h30	-	82h30	3	6	**33**	**67**
Methodology Teaching Unit (MTU)										
MTU11		**90h00**	**1h30**		**4h30**		**4**	**8**	**50**	**50**
PW Mechanics	M111	22h30	-	-	1h30	27h30	1	2	**50**	**50**
PW Chemistry 1	M112	22h30	-	-	1h30	27h30	1	2	**50**	**50**
Computer science 1: office automation & Web Technology (5 weeks) + Introduction to algorithms (10 weeks)	M113	45h00	1h30	-	1h30	55h	2	4	**50**	**50**
Discovery teaching unit (DTU)										
DTE11 ***Choose a subject from the four subjects:***		**22h30**	**1h30**				**1**	**2**		**100**
Simple physical systems	D111	22h30	1h30	-	-	27h30	1	2		100
Discovery of university work methods	D111									
Environment	D111									
Biotechnology	D111									
Transversal teaching unit (TTU)										
TTU11		**22h30**	**1h30**				**1**	**2**		**100**
Foreign languages 1		22h30	1h30	-	-	27h30	1	2		100
Total Semester 1		**337h30**	**12h00**	**6h00**	**4h30**		**15**	**30**		

**** Other = Complementary work in biannual consultation***

2- Semester 2

Teaching units	Course Number	SHV	WHV			Other*	Coeff	Credits	Evaluation mode	
		14-16 weeks	Lc	TD	PW	(14-16 weeks)			Continues	Exam
Fundamental Teaching units (FTU)										
FTU21		**202h30**	**9h00**	**4h30**			**9**	**18**	**33**	**67**
Mathematics 2: Analysis and Algebra 2	F211	67h30	3h00	1h30	-	82h30	3	6	**33**	**67**
Physics 2 / Electricity	F212	67h30	3h00	1h30	-	82h30	3	6	**33**	**67**
Chimistry 2 / Thermodynamics and Chemical Kinetic	F213	67h30	3h00	1h30	-	82h30	3	6	**33**	**67**
Methodology Teaching Unit (MTU)										
MTU21		**90h00**	**1h30**		**4h30**		**4**	**8**	**50**	**50**
Practical Work (PW) in Electricity	M211	22h30	-		1h30	27h30	1	2	**50**	**50**
Practical Work (PW) in Chimistry 2	M212	22h30	-		1h30	27h30	1	2	**50**	**50**
Computer science 2 / Programming languages	M213	45h00	1h30		1h30	55h	2	4	**50**	**50**
Discovery teaching unit (DTU)										
DTU21 *Choose a subject from the four subjects:*	D211	**22h30**	**1h30**				**1**	**2**		**100**
Chemistry through basic applications		22h30	1h30	-	-	27h30	1	2		100
Business economics										
History of Sciences										
Renewable energies										
Transversal teaching unit (TTU)										
TTU21	T211	**22h30**	**1h30**				**1**	**2**	**x**	**100**
Foreign languages 2		22h30	1h30	-	-	27h30	1	2	x	100
Total Semester 2		**337h30**	**12h00**	**6h00**	**4h30**		**15**	**30**		

**** Other = Complementary work in biannual consultation***

II – Organization sheets for teaching units

(Establish a file per teaching unit TU)

Semester: 1

Fundamental Teaching units (FTU)

Distribution of the hourly volume of the TU and its subjects.	Course : **135h00** Tutorial series (TS) : **67h30** Practical Work (PW): - Personal work: **247h30**
Credits and coefficients allocated to the TU and its subjects	**TU : Coefficient = 9 Credits = 18** **Subject 1:** ***Mathematics 1/ Analysis & Algebra 1*** Credits : 6 Coefficient : 3 **Subject 2** : ***Physics 1/ Point mechanics*** Credits : 6 Coefficient : 3 **Subject 3** : ***Chemistry 1/ Structure of matter*** Credits : 6 Coefficient : 3
Evaluation method (continuous or examination)	**Continuous : 33% ; Exam : 67%**
Description of teaching subjects	**Mathematics 1/ Analysis & Algebra 1** Acquisition of basic mathematical formalisms in Analysis and Algebra and their applications. **Physics 1/ Point mechanics** Acquisition of basic formalisms in material point mechanics and mathematical representations of physical phenomena linked to material point mechanics. **Chemistry 1/ Structure of matter** Acquisition of basic formalisms in chemistry, particularly in the structure of matter describing the atom and the chemical bond as well as the different migrations of electrons and the chemical elements of the periodic table.

Semester : 1

TU : Methodology

Distribution of the hourly volume of the TU and its materials	Course : **22h30** Tutorial series (TS) : - Practical Work (PW): **67h30** Personal work: **110h00**
Credits and coefficients allocated to the TU and its subjects	TU : **Coefficient = 4** **Credits = 8** **Subject 1:** ***PW (Practical work) /*** **Mechanics** Credits : 2 Coefficient : 1 **Subject 2 :** ***PW (Practical work) / Chemistry 1*** Credits : 2 Coefficient : 1 **Subject 3 :** ***Computer science 1/ Algorithmic*** Credits : 4 Coefficient : 2
Evaluation method (continuous or examination)	**Continuous : 50% ; Exam : 50%**
Description of teaching subjects	**Practical work (PW) / mechanics** Consolidation of theoretical knowledge acquired in Point Mechanics course (Physics 1). Manipulation of measuring equipment and visualization of phenomena linked to classical mechanics. **Practical work / chemistry 1** Introduction to chemical handling while respecting safety rules. Learning basic practical chemistry work and handling measuring equipment. **Computerscience 1: Office automation and algorithmic** Computer basics - Basic concept of algorithm and methods of its construction.

Semester : 1

TU: Discovery

Distribution of the hourly volume of the TU and its materials	Course : **22h30** Tutorial series (TS) : - Practical Work (PW): **22h30** Personal work : **27h30**
Credits and coefficients allocated to the TU and its subjects	TU : **Coefficient = 1** **Credits = 2** **One (01) subject to choose from:** **Subject 1:** ***Simple Physical Systems*** Credits : 2 Coefficient : 1 **Subject 2:** ***Discovery of University Work Methods*** Credits : 2 Coefficient : 1 **Subject 3 :** ***Environment*** Credits : 2 Coefficient : 1 **Subject 4 : Biotechnology** Credits : 2 Coefficient : 1
Evaluation method (continuous or examination)	**Exam : 100%**
Description of teaching subjects	***Simple Physical Systems*** ***Discover the applications of physical laws to simple systems which are the basis of many tools and machines.*** ***Discovery of University Work Methods*** Discover work and how to work at a university level, and learn its different aspects such as writing and reading on traditional and digital media. ***Environment*** Discover the environment and its relationship with humans as well as pollution and its multiple sources causing dangers to the environment and ecology. ***Biotechnology*** Discover biotechnology and sources of biotechnology.

Semester: 1

TE: Transversal

Distribution of the hourly volume of the TU and its materials	Course : **22h30** Tutorial series (TS) : - Practical Work (PW): - Personal work : **27h30**
Credits and coefficients allocated to the TU and its subjects	TU : **Coefficient = 1** **Credit = 2** **Subject**: ***Langues étrangères 1*** Credit : 2 Coefficient : 1
Evaluation method (continuous or examination)	**Exam : 100%**
Description of teaching subjects	**Langues étrangères 1 : Anglais 1 ou Français 1** Acquire a scientific language culture and an ability to use oral presentation techniques.

222**Semester: 2**

TU : Fundamental

Distribution of the hourly volume of the TU and its materials	Course : **135h00** Tutorial series (TS) : **67h30** Practical Work (PW): - Personal work: **247h30**
Credits and coefficients allocated to the TU and its subjects	FU : **Coefficient = 9** **Crédits = 18** **Subject 1:** ***Mathematics 2/ Analysis and Algebra 2*** Credits : 6 Coefficient : 3 **Subject 2** : ***Physics 2/ Electricity*** Credits : 6 Coefficient : 3 **Subject 3** : ***Chemistry 2/ Thermodynamics and Chemical Kinetics*** Credits : 6 Coefficient : 3
Evaluation method (continuous or examination)	**Continuous : 33% ; Exam : 67%**
Description of teaching subjects	**Mathematics 2/ Analysis and Algebra 2 Credits** Mathematics 2 offers a high level of specialization in Analysis and Algebra such as integral calculus, solving differential equations, limited expansion and matrix calculus with many very useful applications for the physicist or chemist. **Physics 2/ Electricity** Physics 2 is the subject which teaches the basic formalisms in electricity and magnetism. **Chemistry 2/ Thermodynamics and Chemical Kinetics** Chemistry 2 allows the student to acquire the basic formalisms of thermodynamics and its fundamental principles introducing state functions such as enthalpy and entropy as well as chemical kinetics during chemical reactions.

Semester: 2

TU : Methodology

Distribution of the hourly volume of the TU and its materials	Course : **22h30** Tutorial series (TS) : - Practical Work (PW): **67h30** Personal work: **110h00**
Credits and coefficients allocated to the TU and its subjects	TU : **Coefficient = 4Crédits = 8** **Subject 1:** ***Practical work/ PW Electricity*** Credits : 2 Coefficient : 1 **Subject 2:** ***Practical work/ PW Chemistry 2*** Credits : 2 Coefficient : 1 **Subject 3 :** ***Computer science 2 / Programming languages*** Credits : 4 Coefficient : 2
Evaluation method (continuous or examination)	**Continuous : 50% ; Exam : 50%**
Description of teaching subjects	**Subject 1 :** ***PW Electricity*** Manipulation of electrical measuring equipment and visualization of electrical phenomena and experimental verification of fundamental laws. Writing a practical work session report with report of the results and their interpretation. **Subject 2 :** ***PW Chemistry 2*** Experimentation with practical work in thermodynamics and chemical kinetics and preparation of practical work session reports with report of the results and their interpretation. **Subject 3 :** ***Computer science 2 / Programming languages*** Learn a computer programming language such as Fortran, Octave, or other preferably open source language. Creation of flowcharts and development of computer programs written in this language.

Semester : 2

TU: Discovery

Distribution of the hourly volume of the TU and its materials	Course : **22h30** Tutorial series (TS) : - ***Practical work*** PW: **22h30** Personal work : **27h30**
Credits and coefficients allocated to the TU and its subjects	TU : **Coefficient = 1** **Credits = 2** **One (01) subject to choose from:** **Subject 1: *Chemistry through basic applications*** Credits : 2 Coefficient : 1 **Subject 2: *Business Economics*** Credits : 2 Coefficient : 1 **Subject 3 : *History of science*** Credits : 2 Coefficient : 1 **Subject 4: *Renewable Energies*** Credits : 2 Coefficient : 1
Evaluation method (continuous or examination)	**Exam : 100%**
Description of teaching subjects	**Chemistry through basic applications** Through applications of some basic notions of chemistry, certain concepts will be better assimilated ***Business Economics*** ***In construction !!*** ***History of science*** Very interesting subject which gives the student the opportunity to discover the evolution of sciences from Antiquity to the 20th century, and the scientists who marked time with their discoveries. ***Renewable Energies*** This subject introduces the student to other forms of so-called non-renewable or new energy such as solar energy, wind energy, biomass, etc.

Semester : 2
TU : Transversal

Distribution of the hourly volume of the TU and its materials	Course : **22h30** Tutorial series (TS): - Practical work PW: - Personal work: **27h30**
Credits and coefficients allocated to the TU and its subjects	TU : **Coefficient = 1** **Credit = 2** **Subject**: **Foreign languages 2** Credit : 2 Coefficient : 1
Evaluation method (continuous or examination)	**Exam : 100%**
Description of teaching subjects	***Foreign languages 2: English 2 or French 2*** Improved language acquisition and scientific writing skills.

III - Detailed program by subject

(Detailed sheet per subject)

Semester 1 + Semester

Semester: 1

Teaching unit: Fundamental

Course title: Mathematics 1/Analysis & Algebra 1

Teaching Objectives:

Of paramount importance for a scientist, this course allows students to acquire basic formalisms in mathematics for analysis and algebra and their applications.

Recommended Prerequisite Knowledge:

It is recommended to have a solid grasp of mathematics in secondary education.

Course content:

Analysis 1

Set theory.

Applications: direct image, inverse image, injection, surjection, and bijection.

Equivalence relations, Order relations. Structure of the field of real numbers on IR:

Total order relation on IR, absolute value, interval, bounded set, reasoning by recurrence.

Real functions of one real variable:

Domain of definition, function composition, periodic functions, even functions, odd functions, bounded functions, function variations. Function limits: Limit definition, right-hand limit, left-hand limit, infinite limits, limits at infinity, indeterminate forms, algebraic operations on limits, limit of a composite function. Continuous functions: Continuity definition at a point, right-hand continuity, left-hand continuity, continuity extension, algebraic operations on continuous functions, continuity of a composite function, continuous function on an interval, intermediate value theorem, continuous monotonic functions. Reciprocal functions: Existence and properties, reciprocal trigonometric functions, hyperbolic functions.

Algebra 1

Recap: Laws of internal decomposition, groups, rings, and fields. Vector spaces. Bases and finite dimensions. Linear applications, kernel, image. Operations on linear applications, theorem on the range of a linear application.

Evaluation Method: Continuous assessment: 33% Exam: 67%

References (Books, lecture notes, websites, etc.):

- Elie BELORIZKY, Outils mathématiques à l'usage des scientifiques et des ingénieurs, EDP Sciences,

Paris, (2007).

- C. ASLANGUL, Des mathématiques pour les sciences2, Corrigés détaillés et commentés des exercices

et problèmes, De Boeck, Bruxelles (2013).

- F. COTTET-EMARD, Analyse : tome 1 cours et exercices corrigés, DeBoeck, Bruxelles (2005).

- P. PHILIBOSSIAN, Analyse: rappels de cours, exercices et problèmes résolus, Dunod Paris (1998).

- K. ALLAB, éléments d'analyse (Fonction d'une variable réelle). OPU Alger, (1986).

- J M Monier, Algèbre 1 : cours et 600 exercices corrigés, 2ème Ed., Dunod Paris (2000)

- C. BABA HAMED, Algèbre 1 : rappels de cours et exercices avec solutions, OPU (1992)

- G. CHRISTOL, Algèbre1 : ensembles fondamentaux arithmétique polynômes, Ellipses Paris, (1995).

- http:// www. les-mathématiques.net

Semester: 1
Teaching unit: Fundamental
Course title: Physics 1/ Point mechanics
Course code: F112

Teaching objectives

The teaching of this subject allows the student to acquire the fundamental notions of classical mechanics linked to the material point through kinematics, dynamics and the concepts of work and energy.

Recommended prior knowledge

It is recommended to have a good command of physical sciences in secondary school.

Course content:

1. Math reminders (2 weeks)

Dimensional equations - error calculations - Vectors

2. Point kinematics (2 weeks)

Rectilinear movement - Movement in space - Study of particular movements - Study of movements in different systems (polar, cylindrical and spherical) - Relative movements.

3. Point dynamics (5 weeks)

The principle of inertia and the Galilean frames of reference - The principle of conservation of momentum - Newtonian definition of force (3 Newton's laws) - Some laws of forces.

4. Work and energy in the case of a material point (5 weeks)

Kinetic energy - Gravitational and elastic potential energy - Force field - Non-conservative forces.

Evaluation method: Continuous: 33% Exam: 67%

Références *(Books and handouts, websites, etc.)* :

- T. HANNI, *Mécanique générale cours et exercices*, OPU (1996).
- J. TAYLOR, *Mécanique classique*, Ellipses, Paris, (2007)
- J TAYLOR, *Incertitudes et analyse des erreurs dans les mesures physiques*, Dunod, Paris, (2000).
- H. LUMBROSO, *Mécanique du point*, 1ère an. MPSI - PCSI - PTSI - Problèmes résolus, Dunod, Paris (2002)
- D. TEYSSIER, *Mécanique du point : exercices corrigés*, Ed. Ellipses Paris, (2005)
- J. FAGET, J. MAZZASCHI, *Travaux Dirigés de Physique Généralités*, Ed. Vuibert Paris, (1970)
- J. FAGET, J. MAZZASCHI, *Travaux Dirigés de Physique Mécanique*, Ed. Vuibert Paris, (1970)

Semester: 1
Teaching unit: Fundamental
Course title: Chemistry 1/ Structure of Matter

Objectives of the Course:

This course aims to provide students with the basic formalisms in chemistry, particularly within the context of describing atoms and chemical bonding, chemical elements, and the periodic table, along with energy quantification.

Recommended Prerequisites:

It is recommended that students have a solid understanding of physical sciences in secondary education.

Content of the Course:

Structure of the Atom

The nucleus-Atom, element, atomic mass- Radioactivity, nuclear reactions

Energy Quantification

Semi-atomic model-Bohr model -Limitations of the classical approach-Elements of quantum theory-Schrödinger's equation-Quantum numbers -Probability of presence-Hydrogen atom and hydrogenoids-Atomic orbitals- Electronic structure- Polyatomic atoms (Screening effect).

Periodic Classification of Elements

Periodicity (period and group)- Chemical properties (atomic radius, ionization energy, electron affinity, electronegativity).

Chemical Bonding

Classical model- Covalent bonding- Molecular orbitals- σ and π bonds- Energy diagram of molecules, bond order- Ionic bonding- Partial ionic character- Hybridization-Molecular geometry, Gillespie's method.

Evaluation Method:

Continuous Assessment: 33%- Exam: 67%

References (Books, Handouts, Websites, etc.):

M. FAYARD, "Structure électronique atomes et molécules simples," Hermann, France (1969).
Y. JEAN, "Structure électronique des molécules: 1 de l'atome aux molécules simples 3ème Ed.," Dunod, Paris (2003).
M. GUYMONT, "Structure de la matière; Belin Coll.," Paris (2003).
G. DEVORE, "Chimie générale: T1, étude des structures," Coll. Vuibert Paris.

Semester: 1
Teaching unit: Methodology
Course title: Practical Work (PW) / Mechanics

Objectives of the teaching

- Consolidation of theoretical knowledge acquired during the Mechanics of the point (Physical1) with the application of error calculation.
- Learning and visualization of phenomena related to Classical Mechanics.

Previous knowledge recommended

- It is recommended to have mastered the physical sciences well in the secondary cycle.

Course content:

1- Error calculations

2- Verification of Newton's 2nd law

3- Physical pendulum study

4- Free fall

5- Simple pendulum

6- Maxwell's Pendulum

7- Study of the rotation of a solid

8- Verification of the fundamental of a circular motion – conservation of energy mechanical

Evaluation mode:

Continuous evaluation: 50% Exam: 50%

References (Books and handouts, websites, etc.):

- T. HANNI, Mécanique générale cours et exercices, OPU (1996).
- J TAYLOR, Incertitudes et analyse des erreurs dans les mesures physiques, Dunod, Paris, (2000).
- H. LUMBROSO, Mécanique du point, 1 ère an. MPSI - PCSI - PTSI - Problèmes résolus,
- F. FAGET, M. MAZZASCHI, Mécanique du point, Exercices corrigés, Ed. Dunod Paris, (1999).

Semester: 1
Teaching unit: Methodology
Course title: Practical Work (PW) / Chemistry1

Teaching objectives:
Introduction to chemical manipulation, with adherence to safety rules. Learning elementary practical work in chemistry and the use of measurement equipment.

Recommended Prior Knowledge: It is recommended to have a good understanding of physical sciences in secondary education.

Course content:
1- Safety and Introduction to Chemical Manipulation
2- Preparation of a Solution
3- Determination of Molar Mass
4- Acid-Base Titrations
5- Redox Titrations

Evaluation Method: Continuous Assessment: 50% Exam: 50%

References (Books, Course Materials, Websites, etc.):

- Y. JEAN, Electronic Structure of Molecules: From Atom to Simple Molecules, 3rd Ed., Dunod, Paris, (2003).
- M. GUYMONT, Structure of Matter; Belin Coll., Paris, (2003).
- M. KARAPETIANTZ, Constitution of Matter, Ed. Mir, Moscow, (1980).

Semester: 1
Teaching unit: Methodology
Course title: Computer science 1/ Office automation & Web technology (5 weeks) + Introduction to Algorithmics (10 weeks)

Teaching objectives
Learn the basics of computers.
Understand the concept of an algorithm and learn the methods of its construction (Algorithmics).

Recommended prior knowledge
Already have basic notions of mathematical logic.

Course content:
Office Automation & Web Technology (5 weeks)
1. Brief history of the evolution of computing
2. PC architecture: The different hardware components of the PC
3. Principle of operation of a computer
4. Introduction to operating systems
5. Introduction to networks: local network, Internet and Web

Introduction to Algorithmics (10 weeks)
1. Concept of algorithms: definition, syntax, structure of an algorithm, concept of variables, data types and assignment.
2. Entry and exit instructions
3. Control structures:
• Conditional structures: alternatives, multiple choices
• Iterative structures: Loops
4. Tables: vectors and matrices
5. Concept of modularity: function and procedure
6. Development of a complete algorithm: Process of solving any problem.
7. Applications: Calculations of sums and products, application to matrix calculations

Evaluation method: Continuous: 50% Examination: 50%
References (Books and handouts, websites, etc.):

Semester: 1
Teaching unit: Discovery
Course title: Simple physical systems

Teaching objectives

The teaching of this subject allows the student to discover the applications of fundamental physical laws to physical systems. These are the basis of many tools, machines, etc. encountered in everyday life

Recommended prior knowledge

Have basic notions of physics

Course content:

I. Simple pendulum
II. Oscillations and harmonic oscillator
III. Periodicity and synchronizations
IV. Transfer of movements (pulley systems, etc.)
V. From catapult to rockets
VI. Satellites

Evaluation method: Exam: 100%

Semester: 1
Teaching unit: Discovery
Course title: Discovery of University Work Methods

Teaching objectives
The teaching of this subject allows the student to discover how to work or study at the University and learn its different aspects such as writing and reading on traditional and digital media.

Recommended prior knowledge
It is recommended to understand the French language

Course content:
IV. The documentation
1. Classic documentation;
2. Audio-visual documentation;
3. Internet documentation;
4. The bibliography
V. Learn to read
5. Use of the paratext of a magazine or book to check the relevance of the document in relation to the work to be carried out;
6. Learn to move through a work or document to identify the main argumentative elements;
7. Capitalization of knowledge (by reading sheets and by classification).
VI. Taking notes
8. Reading notes;
9. Course or conference notes; 10.Abbreviations;
11. Note storage and use.
VII. Writing a summary report
12. Some tips for writing;
13. Different types of texts for different intentions;
14. Writing strategies;
15. Writing an internship report;
16. Writing a dissertation
VIII. Preparing an oral presentation
17. Oral Expression (Quality of expression, Degree of preparation of the presentation, Clarity of the presentation Respect of the allotted time, Clarity of the presentation);
IX. Training of the future researcher
18. Know how to analyze a problem;
19. Recommend an action plan
20. Work in a community

Evaluation method: Exam: 100%

References (Books and handouts, websites, etc.):
D. Bertrand, H Azrour, Relearning to learn in college, university and in a work context: Management and mastery of transversal skills. Montreal: Guérin Universitaire (2004). D Chassé, R. Prégent. Prepare and give a practical guide presentation. Montreal: Éditions de l'École, (1990)
B. Dionne, To succeed: methodological guide for studies and research (4 ed.). Laval, Quebec: Beauchemin. (2004)
University of Quebec. Information Skills Development Program, (2007). http://pdci.uquebec.ca/. 43.

Semester: 1
Teaching unit: Discovery
Course title: Environment

Teaching objectives
Discovery of the environment and the environmental system from an ecological aspect and by making known all the polluters and the dangers of the pollution caused.

***Recommended prior knowledge**:* Basics in physical sciences

Course content:
I. The environment: definition and relationship with man
Definition of environment. Applications,
Elements of the environment and the environmental system Man and his role in the environment
Effects of industrialization and modern technology on the environment
II. Environmental pollution
Pollution and its origins Sources of pollution
Levels and types of pollution.
III. Air pollution
The atmosphere and atmospheric layers Importance of air for living beings
Definition of Air Pollution and Sources of Air Pollution Dangers of Air Pollution
Acid rains "
Dangers of air pollution on the ozone layer
Danger of the disappearance of the ozone layer on the environment Proposed solutions
IV. Water pollution
Distribution of water on the earth's surface and importance of water Areas of water exploitation
Sources of water pollution
Dangers of water pollution on human health
V. Means of purifying polluted water
Introduction
Classification criteria for water treatment Classification of means of purifying sanitary water and
VI. Biological degradation
Introduction - Conventional biological means for the treatment of polluted water
-Technical water purification stations in Algeria
VII. Pollution of seas and oceans
Introduction and sizes of the oceans Sources of sea pollution Importance of the seas and oceans
Chemical pollution and the dangers inherent in this pollution of the seas and oceans Means of combating oil pollution
VIII. Soil pollution
Introduction and sources of soil pollution
Dangers caused by polluted soils and means of combating them

Evaluation method: Exam: 100%

References (Books and handouts, websites, etc.):
P BONTEMPS, G.ROTILLON, Environmental economics, Paris, La

Semester: 1
Teaching unit: Discovery
Course title: Biotechnology

Objectifs de l'enseignement
Avec cette matière l'étudiant aura découvert de nouvelles sciences telles la biotechnologie et les sources de biotechnologie.

Connaissances préalables recommandées
Il est recommandé d'avoir bien maîtrisé les sciences physiques dans le cycle secondaire.

Course content:
I. Biotechnologie
Définition, Applications, le choix des matériaux à vocation de biomatériaux : métaux et alliages métalliques, les céramiques, les polymères et les matériaux d'origine naturelle
II. Biotechnologie chimique
Synthèse multi étapes de divers principes actif – Hémi et synthèse totale. Synthèse peptidique en phase solide et liquide des peptides bioactifs.
Caractérisation physico-chimique, vectorisation et étude du mode d'action des molécules bioactives -synthétiques ou non.
Mise en évidence, caractérisation et analyse du fonctionnement de différentes classes de récepteurs biologiques.
Etude d'interactions ligand-récepteur, applications. Catalyse enzymatique : principes et applications en chimie thérapeutiques.
III. Biotechnologie environnementale
Définition du concept de biorestauration, Les types de pollution, Mécanisme d'évolution d'une pollution, Caractères spécifiques de la dégradation des hydrocarbures, Les procédés de biorestauration, Les procédés Ex-situ.
Caractérisation des substances indésirables et toxiques, Composition des eaux résiduaires, Principaux paramètres de calcul, Techniques de traitement.
Le traitement des eaux par aérobiose. Principe et dimensionnement des stations d'épuration par boues activées. Les procédés de fermentation avec recyclage cellulaire.
Bilans de matière et cinétique microbienne appliquée à ce type de fermentation.

Mode d'évaluation : Examen : 100%

Références (Livres et polycopiés, sites internet, etc) :

Semester: 1
Teaching unit: Transversal
Course title: Foreign languages 1

Teaching objectives

- Acquisition of a scientific language culture and the basics of everyday language
- Acquisition of skills in oral presentation techniques.

Recommended prior knowledge

It is recommended to have a good level of English/French

Course content of the material:

For English 1

1. Sentences
2. Tenses
3. Noun, Adjective, Article, Adverbs,…etc.
4. Introduction to phonetics and phonology
5. Speech mechanism
6. Sounds of English (vowels, diphthongs, consonants)
7. Transcription and classification

For French 1

1. Grammar
2. Conjugation
3. Spelling
4. Text studies
5. Readings

Evaluation method: Exam: 100%

References (Books and handouts, websites, etc.):

Semester: 2

Teaching unit: Fundamental

Course title: Mathematics 2 / Analysis & Algebra 2

Teaching Objectives:

Of paramount importance for a scientist, this subject allows the student to acquire:

In the analysis part: methods for derivative and integral calculations, various forms of Taylor series, as well as methods leading to the solution of differential equations necessary for solving physics problems.

In the algebra part: matrices and their properties as well as matrix calculus.

Recommended Prerequisite Knowledge: It is recommended to have a solid understanding of the fundamental basics of integral calculus, primitives, and mathematics taught in S1 of L1 in Material Sciences.

Course content:

Analysis / Differentiability: Definition of the derivative number, right-hand derivative, left-hand derivative, differentiable function on an interval, differential notion, geometric interpretation. Calculation of derivatives, derivatives of a composite function, derivative of an inverse function, calculation of successive derivatives, Rolle's theorem, mean value theorem, L'Hopital's rule. Taylor's formula, Mac-Laurin's formula. Taylor Series: Sum, product, quotient, integration, derivation, composition of Taylor series, table of usual Taylor series around the zero point. Primitives and Integrals: Primitive function, integration process, integration by parts, integration by change of variables, integration of rational functions, simple integrals. Double integrals, table of standard primitives. First-order differential equations. Second-order differential equations. Functions with two variables.

Algebra/ Matrices.

Matrix diagonalization.

Determinants.

Eigenvalues and eigenvectors.

Systems of equations.

Evaluation mode: Continuous assessment: 33% Exam: 67%

References (Books, lecture notes, websites, etc.):

- Elie BELORIZKY, Outils mathématiques à l'usage des scientifiques et des ingénieurs, EDP Sciences, Paris, (2007).
- Walter APPEL, Mathématiques pour la physique et les physiciens!, 4ème Ed., H&K Edition, Paris, (2008).
- C. ASLANGUL, Des mathématiques pour les sciences, Concepts, méthodes et techniques pour la modélisation, De Boeck, Bruxelles (2011).
- C. ASLANGUL, Des mathématiques pour les sciences2, Corrigés détaillés et commentés des exercices et problèmes, De Boeck, Bruxelles (2013).
- Piskounov, Tome 2, Calcul différentiel et intégral, Ed. MIR, (1976).- http:// www. les-mathématiques.net

Semester: 2
Teaching unit: Fundamental
Course title: Physics 2/ Electricity

Teaching Objectives:

The objective of teaching this subject is to provide the student with the basics of electricity and electromagnetism.

Recommended prior knowledge

It is recommended to master S1 mathematics (Analysis & Algebra 1).

Course content:

1. Electrostatics (4 weeks)
Electrostatic charges and field - Electrostatic potential - Electric field flow - Gauss's theorem - Electric dipole
2. The conductors (2 weeks)
Definition and properties of conductors in equilibrium - Electrostatic pressure - Capacitance of a conductor and a capacitor.
3. Electrokinetics (4 weeks)
Electrical conductor - Ohm's law - Joule's law - Electric circuits - Application of Ohm's law to networks - Kirchhoff's laws.
4. Magnetostatics (3 weeks) - Lorentz force - Laplace's law - Biot and Savart's law - Magnetic dipole.
5. **Magnetic induction** (2 weeks)

Evaluation method: Continuous: 33% Exam: 67%

References (Books and handouts, websites, etc.):
- Y. GRANJON; Electricity Exercises and Problems; Dunod, Paris, (2003)
- J L CAUBARRERE, Electricity and waves: courses and practical work OPU Algiers, (1986)
- Ediscience Collective: Physics in college: electrostatics and electrokinetics 1st and 2nd year; Ediscience international, (2010)
- M.-N. SANZ, D. CHARDON, F. VANDENBROUCK, B. SALAMITO, Physics all-in-one PC, PC*: corrected lessons and exercises; Dunod, Paris (2014)
- R. A. SERWAY, J. W. JEWETT, JR., A. DUCHARME, M. PériARD, Physics - Volume 2 Electricity and magnetism, Ed. De Boeck, (2013)
- D. FEDULLO, T. GALLAUZIAUX, Electricity: Installing it yourself, Ed. Eyrolles, (2012)

Semester: 2
Teaching unit: Fundamental
Course title: Chemistry 2 / Thermodynamics & Chemical Kinetics

Objectives of the Teaching
The acquisition of basic formalisms of thermodynamics and its fundamental principles introducing thermodynamic quantities and state functions such as enthalpy and entropy, as well as the kinetics of chemical reactions.

Recommended Prerequisite Knowledge
It is recommended to have a mastery of the mathematics from Semester 1 (Analysis & Algebra 1).

Course content:

Generalities on thermodynamics: system, state of a system, variables, and state functions. Notions of equilibrium and transformation of a system. Concept of temperature. Different forms of energy. Ideal gas equation.
First Law of Thermodynamics: Internal energy, work, heat. Statement of the first law. Differential expression of the first law. Application: transformation of an ideal gas (isochoric, isothermal, isobaric, adiabatic). Chemical systems; reaction heat, bond energy. Examples of application to physical systems.
Second Law of Thermodynamics: Natural evolutions. Notions of entropy and free enthalpy, heat engines. Chemical equilibria. Law of mass action, equilibrium constant. Equilibrium factors. Statement of the third law.
Introduction to chemical kinetics: Definition of the rate of a reaction. Main factors influencing the rate of chemical reactions, concentration, temperature. Integrated rate laws.

Evaluation Method: Continuous assessment: 33% Exam: 67%

References (Books and lecture notes, websites, etc.):
- T. BECHERRAWY, Vibrations et Ondes, Tomes 1-4, Ed. Hermes-Lavoisier, (2010).
- H. DJELOUAH, Vibrations et Ondes Mécaniques, OPU, (2011).
- J. BRUNEAUX, Vibrations et Ondes, Ed. Marketing, (2010).
- Y. GRANJON, Exercices et problèmes d'électricité, Dunod, Paris, (2003).
- L. BOREL, D. FAVRAT, Thermodynamique et énergétique, Vol.1.de l'Energie à l'Exergie, PPUR, Collection Mécanique, (2011)
- J-N. FOUSSARD, S. MATHE, Thermodynamique - Bases et applications, Cours et exercices corrigés, 2ème Ed. Dunod, (2010)
- R. MAUDUIT, Thermodynamique en 20 fiches, Ed. Dunod, (2013)

Semester: 2

Teaching unit: Methodology

Course title: Practical Work (PW) / Electricity

Objectives of the teaching

- Consolidation of theoretical knowledge on Electricity.

- Learning and visualization of phenomena related to Electricity.

Previous knowledge recommended

It is recommended to have completed the practical work taught in S1 and to have mastered the physical sciences in the secondary cycle.

Course content:

1- Field and potential measurement (rheographic tank)

2- Electrical circuits (Ohm's Law, association and measurement of resistors)

3- Wheatstone Bridge

4- Oscilloscope and current generator (transformer)

5- Capacitors (association and measurement of capacitors, Charge discharge)

6- Verification of the law of Biot and Savart

7- Determination of the Earth's magnetic field

Evaluation mode:

Continuous evaluation: 50% Exam: 50%

References (Books and handouts, websites, etc.) :

- J L CAUBARRERE, Electricité et ondes : cours et travaux pratiques OPU Alger, (1986)

- A. BENTOUNSI, Electricité générale: T2, Exercices résolus, OPU, Alger, (1992)

- Collectif Ediscience : La physique en fac : électrostatique et électrocinétique 1ère et 2ème année ; Ediscience international, (2010)

- D. FEDULLO, T. GALLAUZIAUX, Electricité : Réaliser son installation par soi-même, Ed. Eyrolles, (2012)

- De H. LARGEAUD, Le schéma électrique, Ed. Eyrolles, (2006)

Semester: 2
Teaching unit: Methodology
Course title: Practical Work (PW) / Chemistry 2

Teaching objectives:
Consolidation of theoretical knowledge on thermodynamics. Learning and visualization of phenomena related to thermodynamics.

Recommended Prior Knowledge:
It is recommended to have completed the practical work taught in S1 and to have a mastery of physical sciences in secondary education.

Course content: Thermodynamics

1- Measurement of the heat capacity of liquids
2- Thermodynamic properties of Ideal Gases (GP)
3- Measurement of the ratio of specific heats of a gas
4- First law of thermodynamics Kinetics
5- Inversion of sucrose
6- Ester saponification (order 2)
7- Decomposition of hydrogen peroxide.

Evaluation Method: Continuous Assessment: 50% Exam: 50%

References (Books, Course Materials, Websites, etc.):

- R. MAUDUIT, Thermodynamics in 20 Sheets, Ed. Dunod, (2013)
- B. FREMAUX, Elements of Kinetics and Catalysis, Ed. Tec. & Doc, (1989).
- B. DIU et al, Thermodynamics, Editions Hermann, Paris, (2007).

Semester: 2
Teaching unit: Methodology
Course title: Computer Science 2/ Programming Language

Teaching objectives
Mastery of computer tools through the teaching of advanced programming languages and the design of simple computer codes.

Recommended prior knowledge
It is recommended to be proficient in using the computer,

Course content:
The language refers to: C language, Fortran, Octave, Silab, Matlab, Mathematica,……..
1- Presentation of Language 2- Rules of language
3- Elementary operations
4- Control structures (loops, conditions, etc.) 5- Inputs/Outputs
6- Concept of subprogram (function or subroutine, etc.) 7- Matrices (vectors, tables, etc.)
8- Graphics
9- External program calls,

Evaluation method:
Continuous: 50% Examination: 50%

Références (Livres et polycopiés, sites internet, etc) :
For MATLAB
- M. DJEBLI & H. DJELOUAH, Initiation à MATLAB, OPU, (2013).
- R. DUKKIPATI, MATLAB, an introduction with applications, New Age International Publishers, India, (2010).
- C. WOODFORD and C. Phillips, Numerical methods with worked examples: MATLAB edition, 2nd Ed. Springer Ltd, (2013).
For C et C++
- C. DELANNOY, ‘’C++ pour les programmeurs C’’, 6ème Ed., Eyrolles, Paris, (2004).
- C. CASTEYDE, ‘’Cours de C/C++’’, Copyright, (2005).
For FORTRAN
- B. HAHN, ‘’Introduction to Fortran 90 for scientists and engineers’’, Capetown University, South Africa, (1993).
- Ph. D’Anfray, ‘’Fortran 77’’, Université Paris XIII, (1998).
- P. CORDE et A. FOUILLOUX, Langage Fortran, Support de cours, IDRIS, (2010).
- S. LIPSCHUTZ, Programmation fortran : Théorie et Applications /

Semester: 2
Teaching unit: Discovery
Course title: Chemistry through basic applications

Teaching objectives

Teaching this subject allows the student to discover the applications of some basic notions of chemistry. These applications will allow the deepening of certain concepts through productions which may possibly call upon demonstrations by video presentation,

Recommended prior knowledge

Have basic notions of chemistry

Course content:

1. Permanent and temporary coloring
2. Cryogenics
3. Non-missible fluids
4. Volcano and spontaneous eruptions
5. Superfluids
6. Carbon: same atom different materials

Evaluation method: Exam: 100%

Semester: 2
Teaching unit: Discovery
Course title: Business economics

Teaching objectives
Teaching this subject allows the student to discover the field of business in general.

Recommended prior knowledge
It is recommended to be proficient in mathematics

Course content:
Subject: Enterprise economics
Enterprise concept
The institution and the environment
Organization of the institution
Enterprise functions
Economic analysis tools for the institution
Enterprise growth patterns

Evaluation Mode: Examination: 100%

References (Lives and copies, internet sites, etc.)

المراجع:
1- إقتصاد المؤسسة ناصر دادي عدون ديوان المطبوعات الجامعية الجزائر
2- الإتصال وإتخاذ القرارات فريد كورتل دار كنوز المعرفة عمان الأردن2011

Semester: 2
Teaching unit: Discovery
Course title: History of Science

Teaching objectives
The objective of this module is to understand civilizations and the evolution of the human mind through the ages, to follow the different stages of the formation of scientific concepts and to improve the content of knowledge and its transmission to learners. .

I. Appearance of science, its characteristics
a) Birth and development of scientific activities
b) Interaction between science and society
II. Science in ancient civilizations
a) Content of sciences in Babylonian civilization (medicine, astronomy, mathematics, botany)
b) Content of sciences in ancient Egyptian civilization (medicine, astronomy, mathematics, architecture, chemistry)
c) Some aspects of Indian and Chinese civilization.
III. Sciences in Greek civilization
a) Greek philosophical schools
b) Euclid and the book of elements
c) Diophantus and the science of number
d) Ptolemy and astronomy
e) Archimedes and the infinitesimal method
f) Apollonius and the conics
g) Hippocrates and medical sciences
IV. . Sciences in Arab civilization
a) Translation into Arabic of scientific works written in various languages
b) Algebra or the birth of a new discipline
c) Experimental sciences among the Arabs (mechanics, optics, chemistry, botany, agriculture, medicine, etc.)
V. Sciences in European civilization
a) Translation into Latin of Arabic scientific works and circulation of Greek and Arabic sciences in Europe.
b) Introduction to the Renaissance period in Europe (Fibonacci, Leonardo da Vinci, Cardan, Galileo, Copernicus)
c) Introduction to the period of the scientific revolution in Europe (Pascal, Descartes, Leibniz, Newton).

Evaluation method: Exam: 100%

Semester: 2
Teaching unit: Discovery
Course title: Renewable Energies

Teaching objectives
With this subject the student will have discovered the fabulous world of physics.

Recommended prior knowledge Know the physical sciences of the first year SM.

Course content:
General information on energy: Energy?, History of energy and the energy cycle on earth Physical quantities and notions of thermodynamics
The world and energy – Non-renewable energies and the global situation, energy challenges, Energy efficiency, Energy security,
Renewable energies around the world Solar energy
Photothermal solar energy Photovoltaic solar energy Solar energy storage
Wind power ; The biomass
Ocean energy (conversion of thermal energy, waves, tides, ocean currents, environmental impact), Hydro-electric power,
Geothermal energy (availability, low, medium and high enthalpy reservoir), Hydrogen (Production and storage, fuel cells, environmental impact) Operation and interconnection of a solar energy source on the electricity grid. Fuel cells, micro turbines, micro and nano energy plants;
The energies of the future

Evaluation method: Exam: 100%

References (Books and handouts, websites, etc.):

G, Boyle. Renewable Energy, 2nd ed., Oxford, (2004)
A. V, Da Rosa, Fundamental of Renewable Energy Processes, Elsevier Academic Press, (2005)
J. H. Kunstler, The end of oil: The real challenge of the 21st century, Plon, (2005).
B. Sorenson, Renewable Energy Conversion, Transmission, and Storage, Elsevier Academic Press, (2008)
B. Wu, N. Zargari, S. Kouro, Power Conversion and Control of Wind Energy Systems, Wiley, (2011).

http://www.mrnf.gouv.qc.ca/energie/statistiques/statistiques-consommation-energie.jsp
http://www.mrnf.gouv.qc.ca/publications/energie/strategie/strategie-energetique-2006 -2015.pdf
www.energybulletin.net

Semester: 2
Teaching unit: Transversal
Course title: Foreign languages 2

Teaching objectives
Improved language acquisition and scientific writing skills.

Recommended prior knowledge
It is recommended to have a good level of English/French
Course content:
For English 2
1. Grammar
2. Translation English-French and French-English
3. Scientific articles
4. Scientific reviews

For French 2
1. Introduction to scientific writing
2. French-speaking authors
3. Illustrated works
4. Scientific article in French
5. Scientific work in French

Evaluation method: Exam: 100%

References (Books and handouts, websites, etc.):

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National PedagogicalCommittee of the Field

Science of matter (NPCF-SM)

L2 repositories
for the Physics & Chemistry sectors

Dece 22, 2022

Semester 3

Teaching Unit	Subjects		Crédits	Coefficient	Weekly HV			SHV (15Week)	Other *	Evaluation method	
	Code	Title			Lectures	TS	PW			Continuous assessment	Final exam
Fundamental TU Code : FTU12 Credits : 20 Coefficient:10	F121	Series & Differential Equations	6	3	3h00	1h30		67h30	82h30	33%	67%
	F122	Analytical Mechanics	6	3	3h00	1h30		67h30	82h30	33%	67%
	F123	Vibrations &Waves	4	2	1h30	1h30		45h00	55h00	33%	67%
	F124	Geometric Optics &Physics	4	2	1h30	1h30		45h00	55h00	33%	67%
Methodology TU Code : MTU12 Credits : 07 Coefficient:04	M121	PC Vibrations & Waves	2	1			1h30	22h30	27h30	100%	
	M122	PC in Geometric Optics &Physics	2	1			1h30	22h30	27h30	100%	
	M123	1h30 Lectures+ 1h30TS ou PC/week									
		Numerical Methods and Programming	3	2	1h30	1h30		45h00	30h00	50%	50%
Discovery TU Code : DTU12 Credits : 02 Coefficient:02	A subject to choose from:										
	D121	Probability & statistics	2	2	1h30	1h30		45h00	05h00	33%	67%
		Physical crystallography									
		History of Physics									
		Mineral Chemistry									
TransversalTU Code : TTU12 Credits : 01 Coefficient:01	T121	English3	1	1	1h00			15h00	10h00		100%
Total Semester 3			30	17	13h00	07h30	04h30	375h00	375h		

Other*: additional work in biannual consultation

Field «Science of matter»;branch «Physic»

Semester 4

Teaching Unit	Subjects		Credits	Coefficient	Weekly H V			SHV (15Week)	Other*	Evaluation method	
	Code	Title			Lectures	TS	Pw			Continuous assessment	Final exam
Fundamental TU Code : FTU22 Credits : 18 Coefficient:9	F221	Thermodynamics	6	3	3h00	1h30		67h30	82h30	33%	67%
	F222	Function of Complex Variable	4	2	1h30	1h30		45h00	55h00	33%	67%
	F223	Quantum mechanics	4	2	1h30	1h30		45h00	55h00	33%	67%
	F224	Electromagnetism	4	2	1h30	1h30		45h00	55h00	33%	67%
Methodology TU Code : MTU22 Credits : 08 Coefficient:05	M221	PWThermodynamics	2	1			1h30	22h30	27h30	100%	
	1h30 Lectures + 1h30TS ou PC/week										
	M222	Fluid mechanics	3	2	1h30	1h30		45h00	30h00	50%	50%
	M223	General Electronics	3	2	1h30	1h30		45h00	30h00	50%	50%
Discovery TU Code : DTU22 Credits : 03 Coefficient:02	A subject to choose from:		3	2	1h30	1h30		45h00	30h00	33%	67%
	D221	Atomic Physics & Nuclear									
		Concept of Astronomy and Astrophysics									
		Spectroscopy									
		Physico-chemical Analysis Techniques									
Transversal TU Code : TTU22 Credits : 01 Coefficient:01	T221	English4	1	1	1h00			15h00	10h00		100%
Total Semester 4			30	17	13h00	07h30	04h30	375h00	375h		

Other*: additional work in biannual consultation

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Field	Branch	Specialty
Material sciences	Physics	Materials physics

Semester-year organization of specialty courses

(S5et S6)

Semester 5

Teaching unit	Subjects		Credits	Coefficient	Weekly Hourly Volume			SHV (15Week)	Others (Personal work)	Evaluation method	
	Code	Title			Lectures	TS	PW			Continuous assessment %	Exam%
Fundemental TU			**18**	**9**	**9h00**	**4h30**		**202h30**	**247h30**		
Code:FTU13	F131	Quantum mechanics2	6	3	3h	1h30		67h30	82h30	33%	67%
	F132	Solid State Physics1	6	3	3h	1h30		67h30	82h30	33%	67%
	F133	Statistical physics	6	3	3h	1h30		67h30	82h30	33%	67%
Methodology TU			**9**	**5**	**3h00**	**1h30**	**3h00**	**112h30**	**87h30**		
Code:MTU13	M131	Mathematics for Physics	4	2	1h30	1h30		45h00	30h00	50%	50%
	M132	PW Solid physics1	2	1			1h30	22h30	27h30	100%	
	M133	Numerical analysis	3	2	1h30		1h30	45h00	30h00	50%	50%
Discovery TU: choose 1 subject from each group			**2**	**2**	**3h00**			**45h00**	**5h00**		
Code:DTU13	D131	Biophysics	1	1	1h30			22h30	2h30		100%
		Particle physics									
		Component electronics									
	D132	Acoustic	1	1	1h30			22h30	2h30		100%
		Didactic processes									
		Special Relativity									
Transversale TU			**1**	**1**	**1h30**			**22h30**	**2h30**		
Code:TTU13	T131		1	1	1h30			22h30	2h30		100%
Total Semester			**30**	**17**	**16h30**	**6h00**	**3h00**	**375h00**	**342h30**		

Semester 6

Teaching unit	Subjects		Credits	Coefficient	Weekly Hourly Volume			SHV (15Week)	Others (Personal work)	Evaluation method	
	Code	Titled			Lectures	TS	PW			Continuous assessment %	Examen %
Fundemental TU			**18**	**9**	**7h30**	**6h00**		**202h30**	**302h30**		
Code:FTU23	F231	Solid State Physics 2	6	3	3h	1h30		67h30	82h30	33%	67%
	F232	Semiconductor physics	4	2	1h30	1h30		45h00	55h00	33%	67%
	F233	Atomic physics	4	2	1h30	1h30		45h00	55h00	33%	67%
	F234	Properties of crystal defects	4	2	1h30	1h30		45h00	55h00	33%	67%
Methodology TU			**8**	**4**	**1h30**		**4h30**	**90h00**	**85h00**		
Code:MTU23	M231	CW Solid State Physics 2	2	1			1h30	22h30	27h30	100%	
	M232	Method of analysis and characterization	4	2	1h30		1h30	45h00	30h00	50%	50%
	M233	CW Semiconductor physics	2	1			1h30	22h30	27h30	100%	
Discovery TU: choose 1 subject from each group			**3**	**3**	**3h00**	**1h30**		**67h30**	**7h30**		
Code:DTU23	D231	Materials technology	1	1	1h30			22h30	2h30		100%
		Physical didactics									
		Ethics and Academic Deontology									
	D232	Lasers	2	2	1h30	1h30		45h00	5h00	50%	50%
		Plasmas									
		Nanotechnology									
		Optoelectronics									
		Solar photocell									
		New materials and applications									
Transversale TU			**1**	**1**	**1h30**			**22h30**	**2h30**		
Code:TTU23	T231	Scientific English 2	1	1	1h30			22h30	2h30	50%	50%
Total Semester			**30**	**17**	**13h00**	**7h30**	**4h30**	**375h00**	**397h30**		