APPENDIX A1

Preparatory Cycle

Curriculum Handbook

List of Documents
A1.1 Study Guide and Credits A1.2 Semester 1 Modules' Handbook A1.3 Semester 2 Modules' Handbook A1.4 Semester 3 Modules' Handbook A1.5 Semester 4 Modules' Handbook A1.6 Objectives and Learning Outcomes

A1.1 Study Guide & Credits

Table 1.Total ECTS Credits per Semester

Semester	In Class hours /week	Self Study hours/week	Total workload/week	Total workload/semester	ECTS Credits
	Preparatory Cycle				
S1	30.5 H	23 H	53.5 H	749 H	**29.96**
S2	30.5 H	23 H	53.5 H	749 H	**29.96**
S3	30.5 H	23 H	53.5 H	749 H	**29.96**
S4	30.5 H	23.5 H	54 H	756 H	**30.24**
	Engineering Cycle				
S1	29 H	21 H	50 H	700 H	**28**
S2	33.5 H	23.5 H	57 H	798 H	**31.92**
S3	31 H	20 H	51 H	714 H	**28.56**
S4	34 H	25 H	59 H	826 H	**33.04**
S5	27.5 H	21.5H	49 H	686 H	**27.44**
S6	0 H	57.14 H	57.14 H	800 H	**32**
Total ECTS Credits					**301.08**
Note: An average of 60 ECTS credits is required to complete the studies of one academic year.					

Table 2. Workload distribution during the 1st year of the Preparatory Cycle

Code	Module/Course	Coeff.		1st Semester (S1)		2nd Semester (S2)		Workload's Hours	Workload's ECTS Credits
		S1	S2	In Class Hours	Self Study Hours	In Class Hours	Self Study Hours		
P101	Calculus	3	6	63	42	63	42	210	8,4
P102	Algebra	3	6	63	42	63	42	210	8,4
P103	General Physics	4	8	84	63	84	63	294	11,76
P104	Materials	1,5	3	21	21	21	21	84	3,36
P105	Mechanics	1,5	3	21	21	21	21	84	3,36
P106	Electrical Circuits	1,5	3	21	21	21	21	84	3,36
P107	Air Navigation	2	4	21	21	21	21	84	3,36
P108	Chemistry	2	4	28	21	28	21	98	3,92
P109	Computer Science	1,5	3	21	21	21	21	84	3,36
P110	English	2	4	42	14	42	14	112	4,48
P111	Big Data and IoT	1,5	-	21	21	0	0	42	1,68
P112	Meteorology	-	4	0	0	21	21	42	1,68
P113	French	1,5	3	21	14	21	14	70	2,8
Coefficients' Total		**25**	**51**						
		76							
Total of workload				***427 H***	***322 H***	***427 H***	***322 H***	***1498 H***	***59,92***

Table 3. Workload distribution during the 2nd year of the Preparatory Cycle

Code	Module/Course	Coeff.		1st Semester (S1)		2nd Semester (S2)		Workload's Hours	Workload's ECTS Credits
		S1	S2	In Class Hours	Self Study Hours	In Class Hours	Self Study Hours		
P201	Calculus	3	3	63	42	63	42	210	8,4
P202	Algebra	3	3	63	42	63	42	210	8,4
P203	General Physics	4	4	84	63	84	63	294	11,76
P204	Engines' Technologies	2	2	21	21	21	21	84	3,36
P205	Introduction to GIS	-	1,5	0	0	21	21	42	1,68
P206	Mechanics	1,5	1,5	21	21	21	21	84	3,36
P207	Digital Electronics	2	2	21	21	21	21	84	3,36
P208	Digital Electronics Labwork			21	0	21	0	42	1,68
P209	Chemistry	2	2	28	21	28	21	98	3,92
P210	Computer Science	2	2	21	21	21	21	84	3,36
P211	Computer Science Labwork			21	21	21	21	84	3,36
P212	English	2	2	21	14	21	14	70	2,8
P213	Meteorology	2	-	21	21	0	0	42	1,68
P214	French	1,5	1,5	21	14	21	14	70	2,8
Coefficients' Total		**25**	**24,5**						
		49,5							
Total of workload				***427 H***	***322 H***	***427 H***	***329 H***	***1505 H***	***60,2***

A1.2 Semester 1 Modules' Handbook

Calculus Module Handbook

Module designation	*Calculus*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P101*
Subtitle, if applicable	
Courses, if applicable	*Calculus*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Mourad Boulsane*
Lecturer	*Dr Mourad Boulsane*
Language	*French*
Relation to curriculum	*This module aims to give students the basic knowledge in Analysis. This allows them to have basic tools in Mathematics used after in their engineer cycle.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credit/Points	*4.2*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics and basic calculus. In particular, basic knowledge of mathematics courses of Baccalaureate.*
Module objectives/intended learning outcomes	***Knowledge:*** - *Describe fundamental properties of the real numbers that lead to the formal development of real analysis.* - *Comprehend regions arguments developing the theory underpinning real analysis.* - *Demonstrate an understanding of limits and how that is used in sequences, series and differentiation.* ***Skills:*** - *Appreciation of the practical nature of physics.* - *Understanding of some of the key factors in successful communication.* - *Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.* - *Construct rigorous mathematical proofs of basic results in real analysis.* ***Competences:*** - *Ability to apply mathematical software packages to physics problems.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to communicate more confidently.*

Content	*CHAP 1: FUNDAMENTAL CALCULATION TECHNIQUES* *1.1. Functions of the Real Variable with Real or Complex Values* *1.1.1. Inequalities in R* *1.1.2. Overview of Functions* *1.1.3. Derivation* *1.1.4. Study of a Function* *1.1.5. Usual Functions* *1.1.5.1. Reciprocal Circular Functions* *1.1.5.2. Hyperbolic Functions* *1.1.5.3. Deriving a Function with Complex Values* *CHAP 2: REAL NUMBERS AND SEQUENCES* *2.1. Usual Number Sets* *2.2. Property of the Upper and Lower Bound* *2.3. Overview of Real Sequences* *2.4. Monotonous Sequences* *2.5. Adjacent Sequences* *2.6. Extracted Sequences* *2.7. Special Sequences* *2.7.1. Geometric Arithmetic Sequences* *2.7.2. Recurring Sequences* *CHAP 3: PRIMITIVES AND LINEAR DIFFERENTIAL EQUATIONS* *3.1. Calculation of Primitives* *3.2. First Order Linear Differential Equations* *3.3. Second-Order Linear Differential Equations with Constant Coefficients* *CHAP 4: LIMITS, CONTINUITY AND DIFFERENTIABILITY* *4.1. Limits and continuity* *4.1.1. Limit of a Function at a Point* *4.1.2. Continuity* *4.1.2.1. Continuation by Continuity in One Point* *4.1.2.2. Continuity on the Left, on the Right* *4.1.2.3. Operations on Continuous Functions at a Point* *4.1.3. Image of an Interval by a Continuous Function* *4.1.3.1. Theorem of Intermediate Values* *4.1.4. Image of a Segment by a Continuous Function* *4.1.5. Theorem of Bijection* *4.1.6. Complex Functions* *4.2. Derivation* *4.2.1. Derived Number, Derived Function* *4.2.1.1. Derivative in One Point, Derived Number* *4.2.1.2. Derivability on the Left, on the Right* *4.2.1.3. Derivability and Derivative on an Interval* *4.2.1.4. Operations on Differentiable Functions and Derivatives* *4.2.2. Local Extremum and Critical Point* *4.2.3. Rolle Theorems and Finite Increments* *4.2.3.1. Rolle's Theorem* *4.2.3.2. Equality of Finite Increments* *4.2.3.3. Inequality of finite increments* *4.2.4. Class C^K Functions* *4.2.5. Complex Functions*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*

Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises in calculus.*
Reading list	*First Year Mathematics Course (Analyse: Cours de Mathématiques Première Année)* http://exo7.emath.fr/cours/livre-analyse-1.pdf *Algèbre et Analyse: Cours de Mathématiques de Première Année avec Exercices*

Algebra Module Handbook

Module designation	*Algebra*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P102*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Mourad Boulsane*
Lecturer	*Dr Mourad Boulsane*
Language	*French*
Relation to curriculum	*This module aims to give students the basic knowledge in Algebra. This allows them to have basic tools in Mathematics used after in their engineer cycle.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credit/Points	*4.2*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics. In particular, basic knowledge of mathematics courses of Baccalaureate.*
Module objectives/intended learning outcomes	***Knowledge:*** *The students understand how:* - *To classify numbers into number sets.* - *To combine polynomial by addition or subtraction.* - *To solve problems of simple Inequalities.* - *Interpret basic absolute value expression.* - *To simplify algebraic expressions, using the commutative, associative and Distributive properties.*

Module objectives/intended learning outcomes	- *To simplify algebraic expressions, using the commutative, associative and Distributive properties.* ***Skills:*** - *Awareness of the importance of accurate experimentation, particularly observation and record keeping.* - *Practical and technical skill required for physics experimentation and an appreciation of the importance of a systematic approach to experimental measurement.* - *Understanding of some of the key factors in successful communication.* - *Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.* ***Competences:*** - *Students apply Mathematics to develop practical, digital electronic and physics applications.* - *Ability to apply mathematical software packages to physics problems.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to communicate more confidently.*
Content	*CHAP 1: COMPLEX NUMBERS AND TRIGONOMETRY* *1.1. Complex Numbers* *1.2. Module* *1.3. Complex Numbers of Module 1 and Trigonometry* *1.4. Trigonometric Forms* *1.5. Equations of the Second Degree* *1.6. Roots n-ths* *1.7. Complex Exponential* *1.8. Geometric Interpretation of Complex Numbers* *CHAP 2: ALGEBRAIC CALCULATIONS* *2.1. Sums and Products* *2.2. Binomial Coefficients and Binomial Formula* *2.3. Linear Systems* *CHAP 3: ARITHMETIC IN THE SET OF RELATIVE INTEGERS* *3.1. Divisibility and Euclidean Division* *3.2. PGCD and Euclid's Algorithm* *3.3. Whole First Between Them* *3.4. Prime Numbers* *3.5. Congruences* *CHAP 4: POLYNOMIALS AND RATIONAL FRACTIONS* *4.1. Ring of Polynomials to an Indeterminate* *4.2. Divisibility and Euclidean Division* *4.3. Polynomial Functions and Roots* *4.4. Derivation* *4.5. Arithmetic in K [X]* *4.6. Irreducible Polynomials of C [X] and R [X]* *4.7. Interpolation Formula of Lagrange* *4.8. Rational Fractions* *4.9. Decomposition Into Simple Elements on C and on R* *CHAP 5: MATRIX CALCULATION* *5.1. Sum, Product, Transpose of a Matrix* *5.2. Invertible Matrix.* *5.3. Interpretation of Linear Systems using Matrices.*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*

Media employed	*Booklets for theoretical exercises (in Algebra).*
Reading list	*First Year Mathematics Course (Algèbre: Cours de Mathématiques Première Année)* http://exo7.emath.fr/cours/livre-algebre-1.pdf http://exo7.emath.fr/un.html https://melusine.eu.org/syracuse/immae/ http://prepa-tunisie.blogspot.com/p/cours-1ere-annee.html *Algèbre et Analyse: Cours de Mathématiques de Première Année avec Exercices*

General Physics Module Handbook

Module designation	*Physics*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P103*
Subtitle, if applicable	
Courses, if applicable	*Physics*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Mohamed Ben Mansour*
Lecturer	*Dr Mohamed Ben Mansour*
Language	*French*
Relation to curriculum	*This module aims to give all the students the same knowledge in physics. This allows them to apply logic theory to develop practical physic applications.*
Type of teaching, contact hours	*6 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*84 contact hours* *63 Hours of Self Study*
ECTS Credit/Points	*5.88*
Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*Unauthorized documents and internet access*
Recommended prerequisites	*For this course, no pre-requisites are required. Also, knowledge of basic mathematics, basic calculus.*
Module objectives/intended learning outcomes	***Knowledge:*** *The course gives students some knowledges:* *- Geometrical optics Approximation.* *- Basic concepts of physics, unit systems, vector algebra and their application kinematics.* *- The Newtonian mechanics, work and energy, impulses and laws energy.* *- Dynamics in a moving frame of reference and relativistic motion.* *- The gravitational field and motion of Kepler.* ***Skills:*** *-. Optical and mechanical problem solving* *- Experimental skills and investigation* ***Competences**:* *- Ability to understand the Optical and mechanical laws application in real life* *- Ability to apply physics theoretical aspects on practical solutions*

Content	*OPTICAL* - *O1. Basic notions of geometrical optics: objects, images, Gaussian conditions.* - *O2. Mirrors and diopter plans.* - *O3. Spherical mirrors in the Gaussian approximation.* - *O4. Thin lenses* *MECHANICAL* - *M1. Reminders and mathematical supplements.* - *M2. Coordinate systems.* - *M3. Kinematic of the point; General.* - *M4. Study of some movements.* - *M5. Repository changes Composition of the movement.* - *M6. Dynamic of the material point in a Galilean reference system.* - *M7. Dynamics of the material point in a non-Galilean frame of reference.* - *M8. Fundamental Theorems of Dynamics; Work, Energy.* - *M9 Newtonian interaction; Central force movement.*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklets for theoretical exercises* *Booklets for practical sessions* *Computers* *Internet*

Materials Module Handbook

Module designation	*Materials*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P104*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Ouassim ghodhbane*
Lecturer	*Dr Ouassim ghodhbane*
Language	*French*
Relation to curriculum	*Baccalaureate degree program*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Unauthorized documents and internet access.*
Recommended prerequisites	*Physics, Chemistry and Mathematics courses (Baccalaureate)*

Module objectives/intended learning outcomes	***Knowledge:*** *After completing this module, a student is expected to:* *- Know the materials characterization's method.* *- Provide knowledge about polymer composite materials with regard to constitutive materials.* *- Know Aeronautical composites materials.* ***Competences**:* *- Be able to selected destructive and non-destructive characterization techniques for materials.* ***Skills:*** *- Acquires fluent communication skills and ability to present the acquired knowledges.*
Content	*An introduction to materials science and different types of materials.* *The metallic material is detailed.* *The Properties for fibers, polymer matrix and core materials are emphasized.* *Thermo-mechanical behaviour, micromechanical models, damage and failure of composite are studied.* *CHAP 1: MATERIALS PROPERTIES* *CHAP 2: MATERIAL CHARACTERIZATION METHOD* *CHAP 3: METALIC MATERIALS*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*projectors (Epson), whiteboard and handouts*
Reading list	1- J. Ruste, Introduction à la science des matériaux, Université de Marne la Vallée, France, 2018. 2 - William D. Callister, Jr., David G. Rethwisch: Materials Science and Engineering - An Introduction, 9th edition , Inc., 2014. 3 - R.Donald, F.Askeland, The Science and Engineering of Materials, 2013 4 - W-D. Calliste, Materials Science and Engineering: An Introduction, 2010 5 - J-F. Shackelford, Introduction to Materials Science for Engineers, Prentice Hall, 2009 6 - Y-W.Chung, Introduction to Materials Science and Engineering, 1st Edition, 2006. 7 - Glossaire Composite Materials, Carma, 2006 8- M.F. Ashby, D.R.H. Jones - Matériaux tome 1 - propriétés et applications tome 2 - microstructure et mise en œuvre Dunod – 1991.

Mechanics Module Handbook

Module designation	*Mechanics*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P105*
Subtitle, if applicable	
Courses, if applicable	*Mechanics*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Ismail Yousfi*
Lecturer	*Ismail Yousfi*
Language	*French*
Relation to curriculum	*Undergraduate degree program*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*

ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Unauthorized documents and internet access.*
Recommended prerequisites	*mathematical, physicals*
Module objectives/intended learning outcomes	***Knowledge:*** - *Identify the main types of technical drawings* - *To assimilate the basic concepts of solid mechanics and the tools needed to solve a simple static solids problem* ***Skills:*** - *Develop analysis and problem-solving skills* ***Competences:*** - *Static solids problem solving* - *Ability to solve, analytically and graphically, the problems Static balance of solids and building elements.*
Content	*CHAPTER I: VECTOR CALCULATIONS-TORTUGAL* *1.1. Definitions* *1.2. Operations on free vectors* *1.3. Moment of a related vector* *1.4. Moment of a slippery vector* *1.5. Torsor Invariants* *1.6. Torsor Operations* *CHAPTER II: PARAMETRIZATION OF MECHANICAL SYSTEMS* *2.1. Section I: Mechanical Parts Modeling* *2.2. Setting the position of a solid in relation to a reference mark* *2.3. Definition, modelling and degree of freedom of elementary links* *2.4. Setting up a solids system* *2.5. Input-Output Law of a Mechanism*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Whiteboard*
Reading list	- *Ricordeau andre, « Premieres notions de dessin technique, mecanique, travail du bois, batiment », André Casteilla, 1977;* - *Rabah Bouzidi, Van Anh Le, Jean-Chistophe Thomas « mécanique des solides indéformables », Lavoisier hermes.*

Electrical circuits Module Handbook

Module designation	*Electrical circuits*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P106*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Abir Lassoued*
Lecturer	*Dr Abir Lassoued*
Language	*French*
Relation to curriculum	*Students will be able to solve electrical problems by incorporating previous theoretical knowledge acquired during the course.* *Students will be able to associate the laws of electronics and properties of components to determine the functionality of an elementary electronic circuit.*

Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Uunauthorized documents and internet access*
Recommended prerequisites	*- Mathematics skills* *- Knowledge of differential equation and calculus is helpful*
Module objectives/intended learning outcomes	***Knowledge:*** - *Students know fundamental concepts in electronics and their applications in basic functions* - *They understand the methods of study of linear currents: laws and general theorems* - *Students study the complex representation and the notion of complex impedance* - *Students treat the analysis methods of linear circuits in permanent sinusoidal mode* - *Students understanding power adaptation in sinusoidal mode* ***Skills:*** - *Students will need to know how to write and solve the equations of node and loop analysis to figure out how component are operating.* - *Students are often required to think logically and apply a particular rule or concept to an electrical problem in order to solve it.* - *Students know how to apply electrical laws and theorems to solve related problems.* - *Students perform circuit analysis* - *Students understand the effect that components have on analog signals* ***Competences:*** - *Students are able to apply the knowledge of electrical circuits to solve electrical problems.* - *The students are able to design and develop simple and useful electrical systems* - *They are able to solve complex problems*
Content	*CHAP 1: CIRCUIT THEORY* 1.1 Electrical dipole 1.2 Electrical networks 1.3 Network theorems and transformation *CHAP 2: TRANSIENT ANALYSIS OF ELECTRIC POWER CIRCUITS* 2.1 Introduction 2.2. Appearance of transients in electrical circuits 2.3. Electric power 2.4. RL circuits 2.5. RC circuits 2.6. RLC circuits
	CHAP 3: STUDY OF LINEAR CIRCUITS IN PERMANENT SINUSOIDAL MODE 3.1 Definitions 3.2 Complex representation 3.3 Analogy between the Fresnel representation and the complex representation 3.4 Interest of the complex representation 3.5 Complex impedance 3.6 Complex impedance association 3.7 Network theorems and transformation 3.8 Power adaptation in sinusoidal mode

Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklet for theoretical exercises*
Reading list	*"Complete Electric Circuits Course for Electrical Engineering" by Ahmed Mahdy* *" Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N. O. Sadiku* *"Fundamental Electrical and Electronic Principles" by Christopher R Robertson* *"General Electronics Course Elements - Resolved Exercises" by Vignisse Pierre*

Air Navigation Module Handbook

Module designation	*Air Navigation*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P107*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester1*
Person responsible for the module	*TOUEL Mohamed*
Lecturer	*TOUEL Mohamed*
Language	*French*
Relation to curriculum	
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Document not authorized.*
Recommended prerequisites	*Unauthorized documents*
Module objectives/intended learning outcomes	***Knowledge:*** *Acquire knowledge of: coordinates, distance, Speed, estimate time of arrival, Nord direction, Track, heading, Bearing, Rhumb line, Great circle. Etc.* ***Skills:*** *-Problem solving* *-Navigation data analysis* ***Competences:*** *- Resolution of problem's navigation (Position, Distance between two points, time, estimate time arrival (ETA), track, heading, bearing etc.)*

Content	*CHAPTER I: THE EARTH* *1.1. Size and shape (ray, diameter and perimeter* *1.2. Movements or motion of the earth.* *First movement around axis of rotation* *Second movement around the Sun.* *1.3. Some reference marks:* *Pole, Great circle, small circle, Equator, Meridian, Parallel, Antipodes, Hemisphere.* *1.4. Geographic's coordinates :* *Latitude, difference between two latitudes.* *Longitude, difference between two longitudes.* *Units used in Navigation and aeronautical;* *Units of angle, units of distance, units of speed, units of capacity, units of weight, units of pressure, units of temperature.* *1.5. Determination of distance between two points : A and B:* *A and B on the same meridian.* *A and B on the same parallel;* *A and B on the Equator.* *1.6. Determination coordinates of the point B Antipode of the point A.* *CHAPTER II ORIENTATION AND DIRECTION ON THE EARTH* *2.1. Different Norths used in Navigation and angles between direction of norths :* *True North, Magnetic North, Magnetic variation, Magnetic compass, Compass North, deviation, compass variation, grid North, great variation, gyro North,* *2.2. The tracks :* *-True Track, Magnetic track, Grid track.* *-Relation between Tracks* *2.3. The headings* *-True Heading, Magnetic Heading, Compass Heading grid Heading and Gyro Heading* *-Relation between Headings.* *- Relation between Tracks and headings: The Drift Angle* *2.4. The Bearing and the relative bearing :* *At the aircraft : True bearing (ZvA) Magnetic bearing (ZmA) Compass Bearing (Zc) Grid bearing (Zg) Gyro bearing (Zgy) and relative bearing.* *Relation between bearing, heading and relative bearing.* *At the station: true bearing (ZvS):Magnetic bearing (Zms) .* *Relation between bearing at the aircraft and bearing at the station.* *Relation between Tracks, Headings and bearing.*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Whiteboard*
Reading list	*JEAN MLERMOZ.*

Chemistry Module Handbook

Module designation	*Chemistry*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P108*
Subtitle, if applicable	
Courses, if applicable	*Chemistry*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Hammedi Tijeni*
Lecturer	*Hammedi Tijeni*
Language	*French*
Relation to curriculum	*This module aims to give students the knowledge in Chemistry*
Type of teaching, contact hours	*2 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*28 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.96*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*There will be one one-hour examination during the term and tests.* *Written examinations are organised at the end of the course correspond to 1h30.*
Recommended prerequisites	*General Chemistry and also Mathematics with basic Algebra and Differential and Integral Calculus.*
Module objectives/intended learning outcomes	***Knowledge:*** *By the end of the course:* - *The students should have a basic understanding of quantum mechanics (a conceptual picture not a mathematical one).* - *Be familiar with models describing those chemical bonds.* ***Skills:*** - *The students will have an appreciation of the quantum mechanical basis of the periodic table.* - *Have an appreciation of the quantum mechanical basis of the periodic table.* - *Account for the horizontal and vertical trends for some atomic properties such as atomic size, ionisation potential, electron affinity and electronegativity.* - *Know how to describe chemical bonding in small molecules of the main group elements.* ***Competences:*** *Students should:* - *The students will be able to write the electronic configuration of all the elements (including those that are exceptions to the Klechkowsky's rule) and understand the reasoning behind this.* - *The students will be able to account for the horizontal and vertical trends of some atomic properties such as atomic size, ionisation potential, electron affinity and electronegativity.*

Content	*THEME 1: ATOMISTICS* *CHAP 1: ATOMIC STRUCTURE* *1.1. Constituents of the atom* *1.2. Bohr's model of hydrogen atom* *1.3. The quantum model of atoms* *1.3.1. Particle-wave duality* *1.3.2. Wave function* *1.3.3. Schrödinger equation* *1.3.4. Quantum numbers* *1.4. Electronic configurations of the elements* *1.4.1. Pauli exclusion principle* *1.4.2. Klechkowsky's rule* *1.4.3. Hund's rule* *1.4.4. Applications* *CHAP 2: PERIODIC TABLE* *2.1. Description of the periodic table* *2.2. Periodic properties* *2.2.1. Atomic radius* *2.2.1.1. Definition* *2.2.1.2. Atomic radius evolution in the periodic table* *2.2.2. Ionic radius* *2.2.3. Ionization energy* *2.2.3.1. Definition* *2.2.3.2. Ionization energy evolution in the periodic table* *2.2.4. Electron affinity* *2.2.5. Electronegativity* *2.2.5.1. Definition* *2.2.5.2. Electronegativity calculation* *• Mulliken scale* *• Pauling scale* *2.2.5.3. Electronegativity evolution in the periodic table* *2.2.6. Redox character* *a- s- Block elements* *b- p- Block elements* *c- d- Block elements* *CHAP 3: CHEMICAL BONDING AND SOLVENTS* *3.1. Covalent bonding* *3.1.1. Introduction* *3.1.2. Lewis theory* *3.1.3. The shapes of molecules and the VSEPR model* *a- VSEPR theory principle* *b- Gillespie formulation and applications* *c- Angles* *3.1.4. Dipolar moment* *a- Dipolar moment of bond's* *b- Dipolar moment of molecules* *3.2. Solvent* *3.2.1. Weak interactions* *3.2.2. Dissolving a molecular or ionic chemical species* *a- Definitions* *b- Characteristics of molecular solvents*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*

Media employed	*Booklets for theoretical exercise* *whiteboard*
Reading list	*Architecture de la matière (puissance prépa).* *- Chimie MPSI (puissance prépa).* *- Structure électronique des molécules (Yves Jean & François Volatron – Dunod).*

Computer Science Module Handbook

Module designation	*Computer Science*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P109*
Subtitle, if applicable	*Algorithmic and C programming*
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Ines Bouzidi*
Lecturer	*Dr Ines Bouzidi*
Language	*French*
Relation to curriculum	*Students will be able to solve problems using algorithmic notation and C programming language.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Unauthorized documents and unauthorized internet access*
Recommended prerequisites	*For this course, no pre-requisites are required. Knowledge in basic algorithmic is appreciated.*
Module objectives/intended learning outcomes	*This course allows participants to have a complete overview of algorithmic and the capabilities offered by C.* *Each notion is accompanied by theoretical applications and practical ones.* ***Knowledge:*** *-Students understand the basic knowledge in algorithmic and C programming* ***Skills:*** *-Students learn how to write programs in C.* *-Students get familiar with solving problems* ***Competences:*** *- Students are able to develop programs*

Content	*CHAP 1: BASIC CONCEPTS OF ALGORITHMIC* *1.1. Definition/ Structure of an algorithm* *1.2. Concept of variable* *1.3. Declaration of a variable* *1.4. Data type: simple, complex* *1.5. Expressions and operators* *1.6. Assignment Instruction* *1.7. Reading and writing instructions* *1.8. From algorithmic to C programming* *CHAP 2: CONDITIONAL STRUCTURES* *2.1. Structure of a test* *2.2. Simple conditional form* *2.3. Generalized conditional form* *2.4. Multiple choice* *2.5. From algorithmic to C programming* *CHAP 3 : ITERATIVE STRUCTURES* *3.1. Deterministic Iterations* *3.2. Indeterminate iterations* *3.3. From algorithmic to C programming*
Study and examination requirements and forms of examination	*Lab Assignments.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Lab Assignments and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklets for theoretical sessions, Booklets for practical sessions* *Computers* *Internet*
Reading list	*'The C Programming Language' by Brian W. Kernighan and Dennis M. Ritchie* *'Learn C the Hard Way' by Zed A. Shaw* *'Head First C' by David Griffiths and Dawn Griffiths*

English Module Handbook

Module designation	*English*
Module level, if applicable	*1st year Preparatory Cycle*
Code, if applicable	*P110*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Amira Gara*
Lecturer	*Amira Gara*
Language	*English*
Relation to curriculum	
Type of teaching, contact hours	*3 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*42 contact hours* *14 Hours of Self Study*
ECTS Credit/Points	*2.24*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Unauthorized documents*
Recommended prerequisites	*Adequate Knowledge of the four skills of English: Writing, Reading, Listening and Speaking.* *Having the B1 level and sufficient knowledge of the Grammar rules, vocabulary and Mechanics.*

Module objectives/intended learning outcomes	***Knowledge:*** *knowledge of these key features :* - *The video presentation material for the double-page real world lessons which focus on the functional and social language students need for day-to-day life.* - *The students are helped with the pronunciation sections that enable them to improve their pronunciation and help them to communicate more effectively.* - *The students are helped with the pronunciation sections that enable them to improve their pronunciation and help them to communicate more effectively.* - *Improving the vocabulary: the vocabulary selection is informed by English Vocabulary Profile built as part of English Profile, a collaborative programme designed to enhance the learning, teaching and assessment of English worldwide. Its main funding partners are Cambridge University PRESS AND Cambridge ESOL and its aim is to create a 'profile' for English linked to the Common European Framework of Reference FOR Languages (CEFR).In addition, this selection is informed by the Cambridge English Corpus and Cambridge Learner Corpus.* - *The students are helped to improve their pronunciation to communicate more effectively.* - *Innovative help with Listening sections help students to understand natural spoken English in context.(Class audio CDs)* - *Encouraging students use Self-study DVD-ROM which contains fully updated exercises in all language areas and includes video, record-and-listen capability, progress checks, customisable tests and an e-portfolio.* - *Quick reviews at the beginning of each lesson get each class off to a lively, student-centred start.* ***Skills:*** *Vocabulary and Grammar are given equal importance and there is a strong focus on reading and writing on one hand and on the other hand on listening, speaking in social situations because based on the communicative approach, the English course combines the best in current methodology with innovative new features designed to make learning and teaching easier* ***Competences:*** *This course is intended to improve student's written and spoken English since it makes use of the Cambridge English Corpus (CEC) which is a computer database of contemporary spoken and written English, which currently stands at over one billion words. It includes British English, American English and other varieties of English. It also includes the Cambridge Learner Corpus, developed in collaboration with the University of Cambridge ESOL Examinations. Cambridge University Press has built up the CEC to provide evidence about language use that helps to produce better language learning materials.*

Content	*CHAPTER 1* *Lesson 1 A: A global language* *Section 1 : Vocabulary : language ability* *Section 2 : grammar :review of the English verb system* *Section 3 : speaking : talking about ability : an English learner profile* *Section 4: reading where's English going?* *Lesson 1B : Open learning* *Section 1 : vocabulary : education* *Section 2 : grammar :uses of auxiliaries* *Section 3 : speaking : talking about education : a role play* *Section 4 : listening and video : online vs campus universities* *Section 5 : writing : a one-minute conversation* *Lesson 1C : Getting results* *Section 1 : vocabulary : verb patterns* *Section 2 speaking : talking about exams* *Section 3: listening and video : exam anecdotes* *Section 4 : testing* *Lesson 1D : Evening classes :* *Section 1: real world: keeping the conversation going.* *Section 2 : speaking :conversation about everyday topics* *Section 3 : talking about evening classes* *Extra practice 1 and progress portfolio 1 : Self-study DVD-ROM 1* *Reading and writing portfolio 1: Planning and drafting.* *CHAPTER 2* *Lesson 2 A:It's bad for you* *Section 1 : vocabulary : expressing frequency* *Section 2 : grammar :present and past habits, repeated actions and states* *Section 3: speaking: attitudes to food and diet. Talking about old and new habits* *Section 4 : listening and video : two people eating habits* *Section 5: Should I eat it or not?* *Section 6 : writing : Your eating habits* *Lesson 2 B : Life's different here* *Section 1 : vocabulary : feelings and opinions* *Section 2: grammar: be used to and get used to.* *Section 3: speaking: different ways of life: talking about things you're used to.* *Section 4 :reading : letter from abroad* *Section 5 : writing :things you're used to* *Lesson 2C : At a glance* *Section 1 : vocabulary : word building : suffixes* *Section 2 : Speaking : Talking about first impressions* *Section 3 : Listening and video : First impression* *Section 4 : Reading : Trust your instincts* *Lesson 2 D : I see your point* *Section 1: Real world: discussion language: agreeing and disagreeing politely.* *Section 2 : Speaking : Discussing controversial statements* *Section 3 : Listening and video : Discussing children's eating habits* *Extra practice 2 and progress portfolio 2: Self-study DVD-ROM 1*

	CHAPTER 3 *Lesson 3 A : Against the law* *Section 1 : vocabulary : crime* *Section 2 : grammar : alternatives for if/ second conditional* *Section 3 : speaking : questions about how law-abiding we are* *Lesson 3 B : It shouldn't be allowed* *Section 1 : vocabulary : crime and punishment collocations* *Section 2 : grammar : third conditional* *Section 3: speaking :discussing the use of guns, how life would be different* *Section 4 : reading : unsuccessful robbery* *Section 5: writing : your imaginary world* *Lesson 3 C : the cost of crime* *Section 1 : vocabulary : verbs and prepositions* *Section 2 : speaking : discussing real-life crimes* *Lesson 3 D : How can I help ?* *Section 1 : real world: making,refusing and accepting offers* *Section 2 : speaking :a role play about offering to help someone* *CHAPTER 4* *Lesson 4 A :urban legends* *Section 1 : vocabulary :phrasal verbs* *Section 2 :grammar :narrative verb forms, past perfect continuous* *Section 3 : speaking : two urban legends* *Section 4 : listening and video : three urban legends* *Lesson 4 B : First books* *Section 1 :vocabulary : books aqnd reading* *Section 2 : grammar :defining, non-defining, reduced relative clauses* *Lesson 4 C : Very funny* *Section 1 :vocabulary : connecting words : reason and contrast* *Section 2 : speaking : talking about practical jokes* *Lesson 4 D :How was your day* *Section 1 : vocabulary : ways of exagerating* *Section 2 : real world : saying you are surprised or not surprised* *Section 3 : Writing : using connecting words in sentences* *CHAPTER 5* *Lesson 5 A : Nature's best* *Section 1 : vocabulary :common adjectives* *Section 2 : grammar : ways of comparing* *Section 3 : speaking : talking about keeping pets/comparing things* *Section 4 : writing : comparing places, things and people* *Lesson 5B : Royal treasure* *Section 1 : vocabulary : phrasal verbs* *Section 2 : grammar : future verb forms* *Section 3 : listening and video : a trip to windsor* *Section 4 : personal plans or arrangements* *Lesson 5 C : the nature of cities* *Section 1 : vocabulary : guessing meaning from context* *Lesson 5 D : carbon footprints* *Section 1 : grammar : adjectives for giving opinions* *Section 2 : real world : discussing languages*

	CHAPTER 6 *Lesson 6 A : Codes of conduct* *Section 1: vocabulary: phrases with take* *Section 2 : grammar : verbs +ing* *Section 3 : speaking : talking about how English people behave* *Section 4 : writing : tips on social conduct* *Lesson 6 B : rebel* *Section 1 : vocabulary : compound adjectives* *Section 2 : grammar : modal verbs :levels of certainty about the future* *Lesson 6 C : dress code* *Section 1 vocabulary :back referencing* *Section 2 : listening and video :attitudes to image* *Lesson 6 D : Sorry to interrupt* *Section 1 : real world :polite interruptions* *Section 2 : speaking* *Lesson 4A: How practical are you?*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show: videos and tracks for the listening tasks* *Booklets and handouts to summarize the course* *A student's book* *A workbook* *A teacher's book* *Class audio CDs* *Teacher's DVD*
Reading list	*Face to Face: Upper-intermediate: Second Edition by Chris Redston and Gillie Cunnigham, Cambridge University Press. Student's book* *Face to Face: Upper-intermediate: Second Edition by Redston and Gillie Cunnigham, Cambridge University Press. Workbook.*
Reading list	*Extra practice and progress portfolios* *Audio and video scripts* *Self-study DVD-ROM instructions* *Language summaries* *Pair and group worksheets*

Big Data and IoT

Module designation	*Graph theory*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P111*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Ines Bouzidi*
Lecturer	*Dr Ines Bouzidi*
Language	*French*
Relation to curriculum	*Students will be able to solve real problems by incorporating previous theoretical knowledge acquired during the course.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*1.5*

Requirements according to the examination regulations	*unauthorized calculator, unauthorized documents*
Recommended prerequisites	*No pre-requisites are required. Students need a knowledge of basic mathematics, basic calculus.* *Linear algebra is appreciated.*
Module objectives/intended learning outcomes	***Knowledge:*** - *Students have to know fundamental concepts in big data and IoT.* - *Students have to know how they describe the basic concepts and terminologies* ***Skills:*** - *Students know how to apply big data and IoT terminology and notation and how to analyse relevant results.* - *Students know how to apply big data and IoT to solve related problems.* ***Competences:*** - *Students have to be able to apply the knowledge of big data and IoT to solve real life problems.*
Content	*CHAP 1: Big Data* - *Big Data Virtualization.* - *Internet of Things(IoT)* - *Big Data Maturity Model.* - *Data Science.* - *Data Federation.* - *Sampling.* - *Big Data Analytics.* - *Clustering.* *CHAP 2: IoT* - *Concepts and Definitions of The Internet of Things (IOT).* - *History of IOT.* - *Requirements, Functionalists and structure of IOT.* - *IOT enabling technologies.* - *IOT Architecture.* - *Major component of IOT (Hardware & Software).* - *IOT communication and networking protocols, Role of wired and wireless communication.*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklet for theoretical exercises*
Reading list	*"Introduction to Big Data" by Trudeau* *"IoT Networks: An Introduction" by Van Steen* *"First Course in Big Data" by Chartrand and Zhang*

French Module Handbook

Module designation	*French*
Module level, if applicable	*First year preparatory cycle*
Code, if applicable	*P113*
Subtitle, if applicable	
Courses, if applicable	*French*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Rym Mansour*
Lecturer	*Rym Mansour*
Language	*French*
Relation to curriculum	*This module introduces aeronautics and geomatics terminology and vocabulary and it focuses on basic knowledge of French grammar*

Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *14 Hours of Self Study*
ECTS Credit/Points	*1.4*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Unauthorized documents*
Recommended prerequisites	*Students should have A2 (according to CEFR) in French language*
Module objectives/intended learning outcomes	***Knowledge**:* - *Students are introduced with key words and vocabulary related to aviation and geomatics.* ***Competences**:* - *Students must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They do oral reading practice in the vocabulary and the key sentences.* - *They read interesting and relevant authentic texts from newspaper articles and website related to aeronautic and geomatics fields* - *They must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They should be able to use correct and accurate concepts of the French grammar* - *They revise important grammar structures and functions* - *They review their mistakes and understand the grammar points with explanations by the instructor* - *Students should be able to make oral presentations and to handle oral conversations.* ***Skills:*** - *They learn how to use effectively and correctly new geomatics words in sentences and paragraphs which enables them to improve their writing skills.* - *They practice and develop their reading skills throw drills of target language.* - *They learn how to develop their listening and reading skills.* - *In class, they develop their awareness of the common problem areas at their level. They focus on accuracy and knowledge of key areas of grammar.* - *They learn how to develop their communication skills.*

Content	*CHAPTER 1: introduction to terminologies in use in French in the aeronautical field: study of a press article: "Air: a quarter of passengers pass through London and Paris.* *CHAPTER 2: introduction to terminologies in use in French in the geomatical field: study of a press file entitled "In Africa, GIS tools matter".* *CHAPTER 3: study of a press article entitled "Rolls-Royce will equip the future A320 and B737": introduction to terminologies in use in French in the field of aircraft engines.* *CHAPTER 4: study of a press article entitled "Satellite data in emergency cases": introduction to terminologies in use in French in geomatics equipments.* *CHAPTER 5: Lesson of grammar: the gender used in French language case study and examples: case studies and examples of the kind used in the aeronautical and geomatical fields.* *CHAPTER 6: How to write numbers in letters: make students discover the rules of writing and numbers in letters and the mode of their reading by practical tests* *CHAPTER 7: demonstrative adjectives and their use in French: case studies and practical exercise of oral and written use of demonstrative adjectives through examples in the aeronauticl and geomatical fields.* *CHAPTER 8: study of an article entitled" Geology: Identification of rock types, mapping faults and structure".* *CHAPTER 9: study of an article entitled "Satellite characteristics: Orbits and swaths"* *CHAPTER 10: Presentation and study of an article entitled "Geodesy: Measuring the figure of the Earth and its gravity field". Introduction to terminologies in use in French in the field of geomatics et geodesy (content and form)* *CHAPTER 11 and CHAPTER 12: presentations (in the fields of aviation and geomatics) by students chosen by themselves: The oral techniques of the presentations: vocabulary used with illustration of the non-verbal gestures valuing balance of the individual competences*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Computers* *Internet*
Reading list	*Newspapers: "Le Monde", "Le Figaro", "La Presse"* *Web sites: www.lesechos.fr* *console.vpaper.ca/géomatique* *https://www.sigtv.fr/* *www.air-journal.fr* *www.journal-aviation.com*

A1.3 Semester 2 Modules' Handbook

Calculus Module Handbook

Module designation	*Calculus*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P101*
Subtitle, if applicable	
Courses, if applicable	*Calculus*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Mourad Boulsane*
Lecturer	*Dr Mourad Boulsane*
Language	*French*
Relation to curriculum	*This module aims to give students the basic knowledge in Calculus. This allows them to have basic tools in Mathematics used after in their engineer cycle.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credit/Points	*4.2*
Weight Factor/Coefficient	*6*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics and basic calculus. In particular, basic knowledge of mathematics courses of Baccalaureate.*
Module objectives/intended learning outcomes	***Knowledge:*** - *Describe fundamental properties of the real numbers that lead to the formal development of real analysis.* - *Comprehend regions arguments developing the theory underpinning real analysis.* - *Demonstrate an understanding of limits and how that is used in sequences, series and differentiation.* ***Skills:*** - *Appreciation of the practical nature of physics.* - *Understanding of some of the key factors in successful communication.* *Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.* - *Construct rigorous mathematical proofs of basic results in real analysis.* ***Competences:*** - *Ability to apply mathematical software packages to physics problems.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* *Ability to communicate more confidently.*

Content	*CHAP 1: CONVEX FUNCTIONS* *1.1. Convex Functions of a Real Variable* *1.1.1. Inequality of Slopes* *1.1.2. Concave Function* *1.2. Derivative Convex Functions, Twice Differentiable* *CHAP 2: ASYMPTOTIC ANALYSIS* *2.1. Comparison Relations: Case of the Sequences* *2.1.1. Relationships of Domination, Neglect, Equivalence* *2.1.2. Links Between Comparison Relationships* *2.1.3. Operations on Equivalents* *2.1.4. Properties Conserved by Equivalence* *2.2. Comparison Relations: Case of Functions* *2.3. Limited Developments* *2.3.1. Standardized Form of Limited Development* *2.3.2. Operations on Limited Developments* *2.3.3. Primitivation of a Limited Development* *2.3.4. Taylor-Young's Formula* *2.4. Examples of Asymptotic Developments* *CHAP 3: INTEGRATION* *3.1. Uniform Continuity* *3.2. Continuous Functions by Pieces* *3.3. Integral of a Continuous Function by Pieces on a Segment* *3.4. Sums of Riemann* *3.5. Integral Function of its Upper Bound* *3.6. Calculation of Primitives* *3.7. Taylor's Formulas* *CHAP 4: DIGITAL SERIES* *4.1. Overview* *4.2. Positive Term Series* *4.3. Serial-Integral Comparison in the Monotonic Case* *4.4. Absolutely Convergent Series* *4.5. Decimal Representation of the Real*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises in calculus.*
Reading list	*First Year Mathematics Course (Analyse: Cours de Mathématiques Première Année)* http://exo7.emath.fr/cours/livre-analyse-1.pdf *Algèbre et Analyse: Cours de Mathématiques de Première Année avec Exercices*

Algebra Module Handbook

Module designation	*Algebra*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P102*
Subtitle, if applicable	
Courses, if applicable	*Algebra*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Mourad Boulsane*
Lecturer	*Dr Mourad Boulsane*
Language	*French*
Relation to curriculum	*This module aims to give students the basic knowledge in Algebra. This allows them to have basic tools in Mathematics used after in their engineer cycle.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credit/Points	*4.2*
Weight Factor/Coefficient	*6*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics. In particular, basic knowledge of mathematics courses of Baccalaureate.*
Module objectives/intended learning outcomes	***Knowledge:*** *The students understand how:* - *To classify numbers into number sets.* - *To combine polynomial by addition or subtraction.* - *To solve problems of simple Inequalities.* - *Interpret basic absolute value expression.* - *To simplify algebraic expressions, using the commutative, associative and Distributive properties.* - *Students are able to:* - *Model problem into linear equation and to solve it.* - *Mention and to analyze characteristics of matrix, and vector generally.* - *Understand the processes derivation 2 dimensions and 3 dimensions spaces into Euclidean Spaces generally.* - *Students understand, and are able to prove and to use characteristics of vector in Euclidean Space to solve related mathematical problems.* - *Students understand, and are able to prove and to use characteristic of linear transformations between Euclidean Spaces.* ***Skills:*** - *Awareness of the importance of accurate experimentation, particularly observation and record keeping.* - *Practical and technical skill required for physics experimentation and an appreciation of the importance of a systematic approach to experimental measurement.*

	- *Understanding of some of the key factors in successful communication.* - *Appreciate how abstract ideas and regions methods in mathematical analysis can be applied to important practical problems.* ***Competences:*** - *Students apply Mathematics to develop practical, digital electronic and physics applications.* - *Ability to apply mathematical software packages to physics problems.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to communicate more confidently.*
Content	*CHAP 1: VECTOR SPACES* *1.1. Vector spaces* *1.1.1. Definition* *1.1.2. Vector subspaces* *1.1.3. Vector families* *1.1.4. Sum of a finite number of subspaces* *1.2. Spaces of Finite Dimension* *1.2.1. Existence of Bases* *1.2.2. Dimension of a Finite Dimensional Space* *1.2.3. Subspaces and Dimension* *CHAP 2: LINEAR APPLICATIONS* *2.1. Linear Applications* *2.1.1. Overview* *2.1.2. Endomorphism* *2.1.3. Determination of a Linear Application* *2.1.4. Rank Theorem* *2.1.5. Linear Forms and Hyper plans* *2.2. Affine Subspaces of a Vector Space* *CHAP 3: MATRICES* *3.1. Operations on Matrices* *3.1.1. Matrix Spaces* *3.1.2. Matrix Product* *3.1.3.Transposition* *3.2. Matrices and Linear Applications* *3.2.1. Matrix of a Linear Application in Databases* *3.2.2. Linear Application Canonically Associated with a Matrix* *3.2.3. Blocks* *3.3. Basic Changes, Equivalence and Similarity* *3.3.1. Basic Changes* *3.3.2. Equivalent Matrices and Rank* *3.3.3. Similar Dies and Trace* *3.4. Elementary Operations and Linear Systems* *3.4.1. Basic Operations* *3.4.2. Linear Systems* *CHAP 4: DETERMINANTS* *4.1. Alternate n-Linear Forms* *4.2. Determining a Family of Vectors in a Database* *4.3. Determinant of an Endomorphism* *4.4. Determinant of a Square Matrix* *4.5. Calculation of Determinants* *4.6. Adjugate Matrix*

	CHAP 5: REAL PREHILBERT SPACES *5.1. Scalar Product* *5.2. Standard Associated with a Scalar Product* *5.3. Orthogonality* *5.4. Orthonormal Bases* *5.6. Orthogonal Projection on a Subspace of Finite Dimension* *5.7. Affine Hyper plans of a Euclidean Space* *5.8. Vector Isometries of a Euclidean Space* *5.9. Orthogonal Matrices* *5.10. Vector Isometries in Dimension 2*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises (in Algebra).*
Reading list	*First Year Mathematics Course (Algèbre: Cours de Mathématiques Première Année)* http://exo7.emath.fr/cours/livre-algebre-1.pdf http://exo7.emath.fr/un.html https://melusine.eu.org/syracuse/immae/ http://prepa-tunisie.blogspot.com/p/cours-1ere-annee.html *Algèbre et Analyse: Cours de Mathématiques de Première Année avec Exercices*

General Physics Module Handbook

Module designation	*General Physics*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P103*
Subtitle, if applicable	
Courses, if applicable	*Physics*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Mohamed Ben Mansour*
Lecturer	*Dr Mohamed Ben Mansour*
Language	*French*
Relation to curriculum	*This module aims to give all the students the same knowledge in physics. This allows them to apply logic theory to develop practical physic applications.*
Type of teaching, contact hours	*6 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*84 contact hours* *63 Hours of Self Study*
ECTS Credit/Points	*5.88*
Weight Factor/Coefficient	*8*
Requirements according to the examination regulations	*Unauthorized documents and internet access*
Recommended prerequisites	*For this course, no pre-requisites are required. Also, knowledge of basic mathematics, basic calculus.*

Module objectives/intended learning outcomes	***Knowledge:*** *The course gives students some knowledges:* *- Simple problems of electrostatics and magnetostatics* *- Basic thermophysics: the law of Thermodynamics 1 and 2 and their application to gas, heat engines and combustion engines.* ***Skills:*** *-. Electrostatics and magnetostatics problem solving* *- Experimental skills and investigation* ***Competences:*** *- Ability to understand the Thermodynamics laws application in real life* *- Ability to apply physics theoretical aspects on practical solutions*
Content	*ELECTROSTATICS – MAGNETOSTATICS* - *EM1. Electrostatic field and potential; General.* - *EM2. Direct calculation of the electrostatic field and potential.* - *EM3. Theorem of Gauss. Applications.* - *EM4. Electrostatic dipole.* - *EM5. Magnetic field.* - *EM6. Circulation of the magnetic field: Ampère theorem.* *THERMODYNAMIC* - *T1. Thermodynamic systems; transformations.* - *T2. Static fluids in the field of gravity.* - *T3. Kinetic theory of perfect gases.* - *T4. The first principle of thermodynamics. Energy balances.* - *T5. The second principle of thermodynamics. Entropy balances.* - *T6. Thermal machines*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklets for theoretical exercises* *Booklets for practical sessions* *Computers* *Internet*

Materials Module Handbook

Module designation	*Materials*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P104*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Ouassim ghodhbane*
Lecturer	*Dr Ouassim ghodhbane*
Language	*French*
Relation to curriculum	*Baccalaureate degree program*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized documents and internet access*

Recommended prerequisites	*Physics, Chemistry and Mathematics courses (Baccalaureate)*
Module objectives/intended learning outcomes	***Knowledge:*** *After completing this module, a student is expected to:* *- Know the materials characterization's method.* *- Provide knowledge about polymer composite materials with regard to constitutive materials.* *- Know Aeronautical composites materials.* ***Competences:*** *- Be able to selected destructive and non-destructive characterization techniques for materials.* ***Skills:*** *- Acquires fluent communication skills and ability to present the acquired knowledges.*
Content	*An introduction to materials science and different types of materials.* *The metallic material is detailed.* *The Properties for fibers, polymer matrix and core materials are emphasized.* *Thermo-mechanical behaviour, micromechanical models, damage and failure of composite are studied.* *CHAP 1: POLYMERS FOR AERONAUTICS* *CHAP 2: COMPOSITE MATERIALS*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	projectors (Epson), whiteboard and handouts
Reading list	1- J. Ruste, Introduction à la science des matériaux, Université de Marne la Vallée, France, 2018. 2 - William D. Callister, Jr., David G. Rethwisch: Materials Science and Engineering - An Introduction, 9th edition , Inc., 2014. 3 - R.Donald, F.Askeland, The Science and Engineering of Materials, 2013 4 - W-D. Calliste, Materials Science and Engineering: An Introduction, 2010 5 - J-F. Shackelford, Introduction to Materials Science for Engineers, Prentice Hall, 2009
Reading list	6 - Y-W.Chung, Introduction to Materials Science and Engineering, 1st Edition, 2006. 7 - Glossaire Composite Materials, Carma, 2006 8- M.F. Ashby, D.R.H. Jones - Matériaux tome 1 - propriétés et applications tome 2 - microstructure et mise en œuvre Dunod – 1991.

Mechanics Module Handbook

Module designation	*Mechanics*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P105*
Subtitle, if applicable	
Courses, if applicable	*Mechanics*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Ismail Yousfi*
Lecturer	*Ismail Yousfi*
Language	*French*
Relation to curriculum	*Undergraduate degree program*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*

Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*A student must have attended at least 75% of the lectures to sit in the final exams.*
Recommended prerequisites	*mathematical, physicals*
Module objectives/intended learning outcomes	***Knowledge:*** - *Identify the main types of technical drawings* - *To assimilate the basic concepts of solid mechanics and the tools needed to solve a simple static solids problem* ***Skills:*** - *Develop analysis and problem-solving skills* ***Competences:*** - *Static solids problem solving* - *Ability to solve, analytically and graphically, the problems Static balance* of solids and building elements.
Content	*CHAP I: KINEMATICS OF THE SOLID* *1.1. Definition* *1.2. Vectors position, velocity and acceleration of a point of a solid* *1.3. Velocity vector fields - acceleration vector fields of a point on a solid* *1.4. Composition of movements* *1.5. Kinematics of solids in contact* *CHAP II: STATICS OF THE SOLID* *2.1. Torsor of mechanical actions* *2.2. Torsor of external mechanical actions applied to a solid system.* *2.3. Torsor of mechanical contact actions of the links perfect*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Whiteboard*
Reading list	- *Ricordeau andre, « Premieres notions de dessin technique, mecanique, travail du bois, batiment », André Casteilla, 1977;* - *Rabah Bouzidi, Van Anh Le, Jean-Chistophe Thomas « mécanique des solides indéformables », Lavoisier hermes.*

Electrical circuits Module Handbook

Module designation	*Electrical circuits*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P106*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Abir Lassoued*
Lecturer	*Dr Abir Lassoued*
Language	*French*
Relation to curriculum	*Students will be able to solve electrical problems by incorporating previous theoretical knowledge acquired during the course.* *Students will be able to associate the laws of electronics and properties of components to determine the functionality of an elementary electronic circuit.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*

Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*unauthorized documents*
Recommended prerequisites	*- Mathematics skills* *- Knowledge of differential equation and calculus is helpful*
Module objectives/intended learning outcomes	***Knowledge:*** - *Students become familiar with quadripoles and especially passive filters.* - *Students know how to describe the constitution of the diode, explain the relationship I = f (U), establish and interpret the real characteristics of a diode and their impacts in simple and complex applications.* - *Students know how to describe the constitution of bipolar transistors NPN and PNP, to explain the characteristic curves of the transistor (Vbe, Ib, Ic, Vce) for each type, to deduce and characterize the non-idealities and their impacts in applications, to make an equivalent diagram in DC and AC, to define the polarization and its objectives and to differentiate the stabilizing properties of these processes.* - *Students know how to define and identify a transistor stage as amplifier EC, CC, BC, to realize a similar scheme small signals and to establish the characteristics of the quadrupole (Zin, Zout, Ai , Av)* - *Students know how to describe the constitution of the transistors of any type of field effect transistor (Jfet - Mosfet), to explain the characteristic curves of the transistor (Id, Vgs and Id, Vds) for each type, of to deduce and characterize the non-idealities and their impacts in the applications, to make an equivalent diagram in DC and AC, to define the polarization and its objectives and to differentiate the stabilizing properties of these processes.* ***Skills:*** - *Students will need to know how to write and solve the equations of node and loop analysis to figure out how component are operating.* - *Students are often required to think logically and apply a particular rule or concept to an electrical problem in order to solve it.* - *Students know how to apply electrical laws and theorems to solve related problems.* - *Students perform circuit analysis* - *Students understand the effect that components have on analog signals*
	Competences: - *Students are able to apply the knowledge of electrical circuits to solve electrical problems.* - *The students are able to design and develop simple and useful electrical systems* - *They are able to solve complex problems*

Content	*CHAP 1: TRANSFER FUNCTION: FILTERS* *1.1. Definitions* *1.2. Filter types* *1.3. Transfer function of a linear filter* *1.4. Bode diagram* *1.5. BODE representation of Elementary Transfer Functions* *CHAP 2: SEMICONDUCTORS: DIODES* *2.1. Introduction: semiconductors physics* *2.2. Definition and symbols* *2.3. Theory of diode operation and important diode properties* *2.4. Electrical model of a diode* *CHAP 3: SEMICONDUCTORS: DIODE CIRCUITS* *3.1. Definition* *3.2. Rectifier Circuits: Half-Wave Rectifier Circuits and Full-Wave Rectifier Circuits* *3.3. Rectifier Circuits with Smoothing Capacitor* *3.4. Voltage - Regulator Circuits* *CHAP 4: SEMICONDUCTORS: BIPOLAR TRANSISTOR* *4.1. Transistor effect* *4.2. Transistor Network and characteristics* *4.3. Transistor in variable regime* *CHAP 5: SEMICONDUCTORS: FIELD EFFECT TRANSISTOR* *5.1. Background* *5.2. Junction field effect transistor JFET* 5.3. *JFET Applications*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklet for theoretical exercises*
Reading list	*"Complete Electric Circuits Course for Electrical Engineering" by Ahmed Mahdy* *" Fundamentals of Electric Circuits by Charles K. Alexander, Matthew N. O. Sadiku* *"Fundamental Electrical and Electronic Principles" by Christopher R Robertson* *"General Electronics Course Elements - Resolved Exercises" by Vignisse Pierre*

Air Navigation Module Handbook

Module designation	*Air Navigation*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P107*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester2*
Person responsible for the module	*TOUEL Mohamed*
Lecturer	*TOUEL Mohamed*
Language	*French*
Relation to curriculum	
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credit/Points	*1.68*

Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*Document not authorized.*
Recommended prerequisites	
Module objectives/intended learning outcomes	***Knowledge:*** *Acquire knowledge of: coordinates, distance, Speed, estimate time of arrival, Nord direction, Track, heading, Bearing, Rhumb line, Great circle. Etc.* ***Skills:*** *-Problem solving* *-Navigation data analysis* ***Competences:*** *- Resolution of problem's navigation (Position, Distance between two points, time, estimate time arrival (ETA), track, heading, bearing etc.)*
Content	*CHAPTER I: THE EARTH* *1.1. Size and shape (ray, diameter and perimeter* *1.2. Movements or motion of the earth.* *1.3. Some reference marks:* *Pole, Great circle, small circle, Equator, Meridian, Parallel, Antipodes, Hemisphere.* *1.4. Geographic's coordinates :* *Latitude, difference between two latitudes.* *Longitude, difference between two longitudes.* *Units used in Navigation and aeronautical;* *Units of angle, units of distance, units of speed, units of capacity, units of weight, units of pressure, units of temperature.* *1.5. Determination of distance between two points : A and B:* *A and B on the same meridian.* *A and B on the same parallel;* *A and B on the Equator.* *1.6. Determination coordinates of the point B Antipode of the point A.* *CHAPTER II ORIENTATION AND DIRECTION ON THE EARTH* *2.1. Different Norths used in Navigation AND ANGLES BETWEEN DIRECTION OF NORTHS :* *True North, Magnetic North, Magnetic variation, Magnetic compass, Compass North, deviation, compass variation, grid North, great variation, gyro North,* *2.2. THE TRACKS :* *-True Track, Magnetic track, Grid track.* *- Relation between Tracks* *2.3. THE HEADINGS* *-True Heading, Magnetic Heading, Compass Heading grid Heading and Gyro Heading* *- Relation between Headings.* *- Relation between Tracks and headings: The Drift Angle*

	2.4. The Bearing and the relative bearing : *At the aircraft : True bearing (ZvA) Magnetic bearing (ZmA) Compass Bearing (Zc) Grid bearing (Zg) Gyro bearing (Zgy) and relative bearing.* *Relation between bearing, heading and relative bearing.* *At the station : true bearing (ZvS):Magnetic bearing (Zms) .* Relation between bearing at the aircraft and bearing at the station. Relation between Tracks, Headings and bearing. *CHAPTER III THE RHUMB LINE OR LOXODROMIE* *Definition. Property, advantage, inconvenience* *3.2. Particular case of the rhumb line.* *3.3. Determination of the True Track and distance of the Rhumb line (m) between two points.* *3.4. Determination of the coordinate of the arrival point.* *CHAPTER IV THE GREAT CIRCLE.* *Definition. Property, advantage, inconvenience* *3.6. Particular case of Great circle.* *3.7. Definition Vertex, Knots, terrestrial's convergence (CG)* *3.8. Determination of the True Azimuth on A (ZvA) True Azimuth on B (ZvB) and distance (p) of the Great Circle between two points.* *Relation between True track of loxodromie, true azimuth (Great circle), convergence, givry's correction*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*WhiteBoard*
Reading list	*JEAN MLERMOZ.*

Chemistry Module Handbook

Module designation	*Chemistry*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P108*
Subtitle, if applicable	
Courses, if applicable	*Chemistry*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Hammedi Tijeni*
Lecturer	*Hammedi Tijeni*
Language	*French*
Relation to curriculum	*This module aims to give students the knowledge in Chemistry*
Type of teaching, contact hours	*2 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*28 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.96*
Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*There will be one one-hour examination during the term and tests. Written examinations are organised at the end of the course correspond to 1h30.*

Recommended prerequisites	*General Chemistry and also Mathematics with basic Algebra and Differential and Integral Calculus.*
Module objectives/intended learning outcomes	***Knowledge:*** - *The goal of this course is to give students a conceptual understanding of the main principles of thermodynamics. The course should give a fundamental knowledge in the theory of thermodynamics and also give an explanation on thermodynamic base of physical and technical processes.* ***Skills:*** *To achieve those goals the student should able to:* - *Describe properties of ideal gases.* - *Use concepts of thermochemistry to explain the energetics of chemical reactions.* - *Describe the concepts of entropy and the second law of thermodynamics and be able to explain spontaneous processes and the impacts on them from the conditions applied.* - *Analyse experimental data on chemical equilibrium to obtain underlying thermodynamic and kinetic parameters.* - *Apply thermodynamic principles to analyze practical problems.* ***Competences:*** *On completion of the course, the student should be able to:* - *Discuss the consequences of the main laws of thermodynamic as well as the connection between intermolecular interactions and changes of state.* - *Calculate changes in thermodynamic properties for various types of changes of state.* - *Carry out thermodynamic calculations on different types of mixtures as well as reaction and phase equilibria and interpret the results.* - *Derive rate laws for simple reactions and evaluate the validity of reaction mechanisms* - *Apply thermodynamic principles of equilibria to practical examples of chemical equilibria, including acid/base and redox systems.* - *Predict the chemical reactivity of molecules from thermodynamic data.* - *Explain thermodynamic laws, variables and functions and their practical significance.* - *Derive important thermodynamic relations.* - *Perform numerical calculations of thermodynamic variables.*

Content	*THEME 2: THERMODYNAMICS* *CHAP 1: INTRODUCTION TO CHEMICAL THERMODYNAMICS* *1.3. Definitions* *1.1.1. Thermodynamic systems* *1.1.2. Constituents of a thermodynamic system* *1.1.3. Thermodynamic variables* *1.1.4. Equation of state* *1.1.5. Function of state* *1.1.6. System equilibrium* *1.1.7. System transformation* *Chemical system transformation* *CHAP 2: FIRST LAW OF THERMODYNAMICS AND APPLICATIONS* *2.1. First law of thermodynamics* *2.1.1. Concept of work and heat* *2.1.2. Work done in reversible and irreversible processes* *2.2. First law of thermodynamics applications* *2.2.1. First law of thermodynamics applications* *2.2.2. First law of thermodynamics applications to the chemical reaction* *CHAP 3: SECOND AND THIRD LAWS OF THERMODYNAMICS* *3.1. Second law of thermodynamics* *3.1.1. Second law consequences* *3.1.2. Calculation of the variation entropy of a pure body* *3.2. Third law of thermodynamics* *3.3. Free enthalpy and chemical potential* *3.3.1. Free enthalpy* *3.3.2. Chemical potential* *3.4. Application to the chemical reaction* *3.4.1. Determination of reaction's entropy* *3.4.2. Reaction's entropy variation with temperature changes* *3.4.3. Reaction's free enthalpy: expression of the reaction's free enthalpy ΔrG* *CHAP 4: CHEMICAL EQUILIBRIUM* *4.1. Guldberg and Waage laws and equilibrium constant* *4.1.1. Law of action mass* *4.1.2. Relationship between ΔrG°(T) and K°(T)* *4.1.3. Variation of equilibrium constant with temperature: Van't Hoff equation* *4.2. Chemical equilibrium displacement laws's* *4.2.1. Temperature effect* *4.2.2. Total pressure effect* *4.2.3. Adding an active constituent* *4.2.4. Addition of an inactive component* *4.3. Phase rule: calculating of system variance* *4.3.1. Definition* *4.3.2. Calculation of system variance* *4.4. Equilibrium of aqueous solutions* *4.4.1. Acid-base equilibra* *4.4.2. Complexation equilibra* *4.4.3. Solubility equilibra* *4.4.4. Redox equilibra*

	Theme 3: Chemical kinetics *1. Introduction* *2. Rate of a chemical reaction* *2.1. Average rate* *2.2. Instantaneous rate* *2.3. Rate of disappearance of a chemical species* *2.4. Factors influencing rate of a reaction* *3. Rate law and order of a reaction* *4. Experimental methods for determining the order of a reaction* *4.1. Degeneration of the order of a reaction* *a- Definition* *b- Application to the degeneracy of the order* *4.2. Integral method* *a- Zero order reaction* *b- First order reaction* *c- Second order reaction* *4.3. Differential method* *4.4. Half-time method* *5. Temperature dependence of the rate of a reaction* *5.1. Relation between the rate of a reaction and the temperature: Arrhenius law* *5.2. Activation energy* *5.3. Activated complex* *5.4. Reaction profile* *6. Catalysis* *6.1. Definition* *6.2. Action mode of a catalyst* *6.3. Different types of catalysis* *a- Homogeneous catalysis* *b- Heterogeneous catalysis*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercise* *whiteboard*
Reading list	*Architecture de la matière (puissance prépa).* *- Chimie MPSI (puissance prépa).* *- Structure électronique des molécules (Yves Jean & François Volatron – Dunod).*

Computer Science Module Handbook

Module designation	*Computer Science*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P109*
Subtitle, if applicable	*Algorithmic and C programming*
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Ines Bouzidi*
Lecturer	*Dr Ines Bouzidi*
Language	*French*
Relation to curriculum	*Students will be able to solve problems using algorithmic notation and C programming language.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*

Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized documents and unauthorized internet access*
Recommended prerequisites	*For this course, no pre-requisites are required. Knowledge in basic algorithmic is appreciated.*
Module objectives/intended learning outcomes	*This course allows participants to have a complete overview of algorithmic and the capabilities offered by C. Each notion is accompanied by theoretical applications and practical ones.* ***Knowledge:*** *-Students understand the basic knowledge in algorithmic and C programming* ***Skills:*** *-Students learn how to write programs in C.* *-Students get familiar with solving problems* ***Competences:*** *- Students are able to develop programs*
Content	*CHAP 1 : PROCEDURES, FUNCTIONS AND POINTERS* *1.1. Subprograms* *1.2. Functions (declaration, call)* *1.3. Procedures (declaration, call)* *1.4. Scope of a variable* *1.5. Formal / effective parameters* *1.6. Parameter Passing Techniques (Pass by value, pass by reference)* *1.7. From algorithmic to C programming* *CHAP 2 : TABLES AND STRINGS* *2.1. Table concept* *2.2. Declaration of a one-dimensional array* *2.3. Table and memory* *2.4. Initialization, access, filling a table* *2.5. String concept* *2.6. Declaration of a string* *2.7. Access to the character* *2.8. Functions handling strings* *CHAP 3 : RECORDINGS: STRUCTURES* *3.1. Definition* *3.2. Syntax and declaration* *3.3. Use of a structure* *CHAP 4 : CHAINED LISTS, STACKS AND QUEUES* *4.1. Definition* *4.2. Chained list Vs table* *4.3. Adding an element: at the head, in the middle and at the end* *4.4. Removal, …* *4.5. Other forms of representation* *4.6. - Stacks and queues: definition and primitives*
Study and examination requirements and forms of examination	*Lab Assignments.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Lab Assignments and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklets for theoretical sessions, Booklets for practical sessions* *Computers* *Internet*
Reading list	*'The C Programming Language' by Brian W. Kernighan and Dennis M. Ritchie* *'Learn C the Hard Way' by Zed A. Shaw* *'Head First C' by David Griffiths and Dawn Griffiths*

English Module Handbook

Module designation	*English*
Module level, if applicable	*1st year Preparatory Cycle*
Code, if applicable	*P110*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Amira Gara*
Lecturer	*Amira Gara*
Language	*English*
Relation to curriculum	
Type of teaching, contact hours	*3 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*42 contact hours* *14 Hours of Self Study*
ECTS Credits/Points	*2.24*
Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*Unauthorized documents*
Recommended prerequisites	*Adequate Knowledge of the four skills of English: Writing, Reading, Listening and Speaking.* *Having the B1 level and sufficient knowledge of the Grammar rules, vocabulary and Mechanics.*
Module objectives/intended learning outcomes	***Knowledge:*** *knowledge of these key features :* - *The video presentation material for the double-page real world lessons which focus on the functional and social language students need for day-to-day life.* - *The students are helped with the pronunciation sections that enable them to improve their pronunciation and help them to communicate more effectively.* - *Improving the vocabulary: the vocabulary selection is informed by English Vocabulary Profile built as part of English Profile, a collaborative programme designed to enhance the learning, teaching and assessment of English worldwide. Its main funding partners are Cambridge University PRESS AND Cambridge ESOL and its aim is to create a 'profile' for English linked to the Common European Framework of Reference FOR Languages (CEFR).In addition, this selection is informed by the Cambridge English Corpus and Cambridge Learner Corpus.*

	- *The students are helped to improve their pronunciation to communicate more effectively.* - *Innovative help with Listening sections help students to understand natural spoken English in context.(Class audio CDs)* - *Encouraging students use Self-study DVD-ROM which contains fully updated exercises in all language areas and includes video, record-and-listen capability, progress checks, customisable tests and an e-portfolio.* - *Quick reviews at the beginning of each lesson get each class off to a lively, student-centred start.* ***Skills:*** *Vocabulary and Grammar are given equal importance and there is a strong focus on reading and writing on one hand and on the other hand on listening, speaking in social situations because based on the communicative approach, the English course combines the best in current methodology with innovative new features designed to make learning and teaching easier* ***Competences:*** - *This course is intended to improve student's written and spoken English since it makes use of the Cambridge English Corpus (CEC) which is a computer database of contemporary spoken and written English, which currently stands at over one billion words. It includes British English, American English and other varieties of English. It also includes the Cambridge Learner Corpus, developed in collaboration with the University of Cambridge ESOL Examinations. Cambridge University Press has built up the CEC to provide evidence about language use that helps to produce better language learning materials.*
Content	*CHAPTER 1* *Lesson 1 A : At the airport* *Section 1 :Vocabulary : state verbs* *Section 2 : Grammar : simple and continuous aspects : activity and state verbs* *Lesson 1 B : Showpiece of China* *Section 1 : Vocabulary :business and trade* *Section 2 : grammar : present perfect simple and continuous* *Lesson 1 C : Life online* *Section 1 : vocabulary : word building :prefixes* *Lesson 1 D : You're breaking up* *Section 1 : vocabulary :on the phone* *Section 2 : real world : problems on the phone* *CHAPTER 2* *Lesson 2 A :I'm broke* *Section 1 : vocabulary : dealing with money* *Section 2 : grammar : wishes, I hope, it's time* *Lesson 2 B : every little helps* *Section 1 : vocabulary phrasal verbs* *Section 2 : wishes* *Lesson 2 C :A bit extra* *Section 1 : vocabulary :synonyms Tipping customs* *Lesson 2D :I didn't realize* *Section 1 : real world :apologizing*

	CHAPTER 3 *Lesson 3 A : the silver screen* *Section 1 : vocabulary : the cinema* *Section 2 : grammar : the passive* *Lesson 3 B: What was it like?* *Section 1 : vocabulary : entertainment adjectives* *Section 2 : grammar : as, like, such as, so, such* *Lesson 3 C: Is it right ?* *Section 1 : vocabulary : homonyms* *Lesson 3 D : It's up to you* *Section : real world : making and responding to suggestions* *CHAPTER 4* *Lesson 4A : How practical are you ?* *Section 1 : household jobs* *Section 2 : grammar : have/get something done, get someone to do something , do something yourself* *Lesson 4 B : The youth of today* *Section 1 :vocabulary :adjectives for views and behavior* *Section 2 : quantifiers* *Lesson 4C :battle of the sexes* *Section 1 : vocabulary : compound nouns and adjectives* *Lesson 4 D : I dd tell you* *Section 1 : grammar : the emphatic form* *CHAPTER 5* *Lesson 5A : meeting up* *Section 1 : vocabulary : work collocations* *Section 2 :grammar :describing future events ; future perfect* *Lesson 5 B :going into business* *Section 1 : vocabulary business collocations* *Section 2 : grammar : reported speech* *Lesson 5 C : the coffee shop* *Section 1 : vocabulary :verb patterns :reporting verbs* *Lesson 5D : advertising works* *Section 1 : vocabulary :advertising* *Section 2 : disscussing language* *CHAPTER 6* *Lesson 6 A : where's my mobile* *Section 1 : vocabulary :colloquial words and phrases* *Section 2 : grammar :modal verbs : deduction in the present and the past* *Lesson 6 B : A great inheritance* *Section 1 : vocabulary :vague language expressions* *Section 2 : grammar : modal verbs : pat forms and related verbs* *Lesson 6C : Spooky* *Section 1 :idioms*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show: videos and tracks for the listening tasks* *Booklets and handouts to summarize the course* *A student's book* *A workbook* *A teacher's book* *Class audio CDs* *Teacher's DVD*

Reading list	*Face to Face: Upper-intermediate: Second Edition by Chris Redston and Gillie Cunnigham, Cambridge University Press. Student's book* *Face to Face: Upper-intermediate: Second Edition by Redston and Gillie Cunnigham, Cambridge University Press. Workbook.* *Extra practice and progress portfolios* *Audio and video scripts* *Self-study DVD-ROM instructions* *Language summaries* *Pair and group worksheets*

Meteorology Module Handbook

Module designation	*Meteorology*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P112*
Subtitle, if applicable	
Courses, if applicable	*Meteorology*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*KEBAIER Abdelaziz*
Lecturer	*KEBAIER Abdelaziz*
Language	*French*
Relation to curriculum	*First, define what is known about meteorology* *then during the session, we try with the students:* *- to study the various fundamental parameters of meteorology* *- to understand the process of formation of certain phenomena weather* *- development and interpretation of analysis weather maps and forecasts* *- the coding and decoding of the meteorological information reported in the various messages used by the pilot and the meteorologist* *- at the end of this module we try to devote tutorials to know how to develop weather forecasts*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents*
Recommended prerequisites	*Knowledge in mathematics, physics, thermodynamics and mechanical fluid help the student to master the knowledge of meteorology.*

Module objectives/intended learning outcomes	***Knowledge:*** *Initiation to meteorology for students who want to pursue an aeronautical engineering career or an airline pilot career.* *Students at the end of the training are supposed to :* *- Know the different meteorological parameters* *- Know also the different meteorological phenomena that form in the atmosphere (Name of the phenomenon, process of formation and characteristics)* *- Explain meteorological messages (name, content and utility)* ***Skills:*** *- Analysis and synthesises skills* ***Competences:*** *- Analyze and exploit the weather maps especially for aeronautics* *- Know the dangerous phenomena for aeronautics* *- Understand how to develop weather forecasts*
Content	*CHAPTER 1 THE ATMOSPHERE* *1.1* Definition 1.2 Composition of the atmosphere 1.3 Vertical structure of the atmosphere 1.4 Characteristics of the different layers of the atmosphere 1.5 Dimensions of the atmosphere *CHAPTER 2 TEMPERATURE* *2.1* Definition and units 2.2 Variation of surface temperature and altitude 2.3 Temperature inversion 2.4 Causes of inversion *CHAPTER 3 ATMOSPHERIC PRESSURE* *3.1* Definition and units 3.2 Variation in surface and altitude pressure 3.3 Representation of the pressure field 3.4 Action Centers 3.5 Relationship between the pressure field and the temperature field *CHAPTER 4 MOISTURE* *4.1* General 4.2 Changes in water status and latent heat 4.3 Variation of relative humidity at the surface and at altitude 4.4 Moisture settings
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	Data show
Reading list	- Meteorological book Volume 1 and Volume 2 - JEAN MERMOZ - Aeronautical Meteorology book ENAC - General Meteorological book ENM

French Module Handbook

Module designation	*French*
Module level, if applicable	*1st year preparatory cycle*
Code, if applicable	*P113*
Subtitle, if applicable	
Courses, if applicable	*French*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Rym Mansour*
Lecturer	*Rym Mansour*
Language	*French*
Relation to curriculum	*This module introduces aeronautics terminology and vocabulary and it focuses on basic knowledge of French grammar*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *14 Hours of Self Study*
ECTS Credits/ Points	*1.4*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized documents*
Recommended prerequisites	*Students should have A2 (according to CEFR) in French language*
Module objectives/intended learning outcomes	***Knowledge**:* - *Students are introduced with key words and vocabulary related to aviation and geomatics.* ***Competences**:* - *Students must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They do oral reading practice in the vocabulary and the key sentences.* - *They read interesting and relevant authentic texts from newspaper articles and website related to aeronautic and geomatics fields* - *They must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They should be able to use correct and accurate concepts of the French grammar* - *They revise important grammar structures and functions*
	- *They review their mistakes and understand the grammar points with explanations by the instructor* - *Students should be able to make oral presentations and to handle oral conversations.* ***Skills:*** - *They learn how to use effectively and correctly new geomatics words in sentences and paragraphs which enables them to improve their writing skills.* - *They practice and develop their reading skills throw drills of target language.*

Content	*CHAPTER 1: introduction to terminologies in use in French in the aeronautical field: study of a press article: "Air: a quarter of passengers pass through London and Paris.* *CHAPTER 2: introduction to terminologies in use in French in the geomatical field: study of a press file entitled "In Africa, GIS tools matter".* *CHAPTER 3: study of a press article entitled "Rolls-Royce will equip the future A320 and B737": introduction to terminologies in use in French in the field of aircraft engines.* *CHAPTER 4: study of a press article entitled "Satellite data in emergency cases": introduction to terminologies in use in French in geomatics equipments.* *CHAPTER 5: Lesson of grammar: the gender used in French language case study and examples: case studies and examples of the kind used in the aeronautical and geomatical fields.* *CHAPTER 6: How to write numbers in letters: make students discover the rules of writing and numbers in letters and the mode of their reading by practical tests* *CHAPTER 7: demonstrative adjectives and their use in French: case studies and practical exercise of oral and written use of demonstrative adjectives through examples in the aeronauticl and geomatical fields.* *CHAPTER 8: study of an article entitled" Geology: Identification of rock types, mapping faults and structure".* *CHAPTER 9: study of an article entitled "Satellite characteristics: Orbits and swaths"* *CHAPTER 10: Presentation and study of an article entitled "Geodesy: Measuring the figure of the Earth and its gravity field". Introduction to terminologies in use in French in the field of geomatics et geodesy (content and form)* *CHAPTER 11 and CHAPTER 12: presentations (in the fields of aviation and geomatics) by students chosen by themselves: The oral techniques of the presentations: vocabulary used with illustration of the non-verbal gestures valuing balance of the individual competences*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Computers* *Internet*
Reading list	*Newspapers: "Le Monde", "Le Figaro", "La Presse"* *Web sites: www.lesechos.fr* *www.air-journal.fr* *www.journal-aviation.com* *console.vpaper.ca/géomatique* *https://www.sigtv.fr/*

A1.4 Semester 3 Modules' Handbook

Calculus Module Handbook

Module designation	*Calculus*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P201*
Subtitle, if applicable	
Courses, if applicable	*Calculus*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Firas Feki*
Lecturer	*Dr Firas Feki*
Language	*French*
Relation to curriculum	*This module aims to give students basic knowledge and skills in Calculus. This allows them to have basic tools in Mathematics and to give students foundational ability in accessing and using information that can be applied to more advanced Mathematics courses.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credits/Points	*4.2*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics and basic calculus. In particular, basic knowledge and skills in mathematics courses of 1st year preparatory cycle.*
Module objectives/intended learning outcomes	***Knowledge:*** - *Give basic properties and results related to topological spaces and algebraic topology.* - *Describe and give examples of the metric topology and the quotient topology and be able to deduce the basic properties of these topologies.* - *Give the definition of concepts related to metric spaces, such as continuity, compactness, completeness and connectedness.* - *Answer question concerning uniform convergence of concrete numerical sequences and series.* - *Students are able to use integration.* ***Skills:*** - *Awareness of the importance of differential equations for solving simple applied problems.* - *Practical and technical skill required for physics experimentation and an appreciation of the importance of a systematic approach to experimental measurement.* - *Appreciate how abstract ideas and regions methods in mathematical, such as Differential Calculation and integration, can be applied to important practical problems.*

	Competences: - *Ability to plan, execute and report on the results of an investigation using appropriate analysis of the data and associated uncertainties.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to apply the Fundamental theorem of Calculus to solve complex problems.* - *Ability to communicate more confidently.*
Content	*CHAP 1: NORMED VECTOR SPACES* *1.1. Norms on a Real or Complex Vector Space and Normed Vector Space Structure* *1.2. Distance Associated with a Norm* *1.3. Convex Part of a Real Vector Space* *1.4. Open Ball - Closed Ball - Sphere - Convexity of the Balls* *1.5. Part, Consequences and Bounded Functions* *1.6. Sequences of Elements of a Normalized Vector Space: Convergence, Algebraic Operations on Convergent Sequences, Bounditude of a Convergent Sequence, Extracted Sequence, Adhesion Value* *1.7. Comparison of Norms* *1.8. Local Study of an Application, Continuity* *1.9. Compact Parts of a Normed Space* *1.10. Continuous Applications on a Compact Part* *1.11. Related Parts by Arcs of a Normed Vector Space* *1.12. Normalized Vector Spaces of Finite Dimension* *1.13. Series with Values in a Normed Space of Finite Dimension* *CHAP 2: NUMERICAL SERIES* *2.1. Topology of a Normed Space* *2.2. Supplement on Numerical Series* *2.2.1. Definitions: Series, Convergent Series, Partial Sum, Residuals of Order n of a Convergent Series* *2.2.2. Comparison Sequences and series* *2.2.3. Reference Series: Geometric Series, Riemann Series* *2.2.4. Positive Term Series, Comparison Relationships* *2.2.5. Absolutely Convergent Series: Application to the Convergence of a Series* *2.2.6. Examples of Semi-Convergent Series* *2.3. Rule of d'Alembert* *2.4. Criterion of Alternate Series, Sign and Framing of Remnants* *2.5. Serial and Integral Comparison, Bertrand Series* *2.6. Summation Comparison Rules: Domination Negligibility and Equivalence* *2.7. Cauchy Product of Two Series: Definition - Convergence: Case where Two Series are Absolutely Convergent.*

	CHAP 3: SEQUENCES AND SERIES FUNCTIONS *3.1. Functions Sequences* *3.1.1. Simple Convergence* *3.1.2. Uniform Convergence* *3.1.3. Limit Properties of a Function Sequence* *3.1.3.1. Continuity* *3.1.4.2. Theorem of the Double Limit.* *3.1.4.3. Integration of a Uniform Limit on a Segment* *3.1.4.4. Derivation of a Function Sequence* *3.2. Function series* *3.2.1. Simple Convergence and Uniform Convergence* *3.2.2. Normal Convergence* *3.2.3. Sum Properties of a Function Series* *3.2.3.1. Continuity* *3.2.3.2. The Double Limit Theorem* *3.2.3.3. Sum and Integral Permutations on a Segment* *3.2.3.4. Derivability* *3.3. Weierstrass Theorem: Any Continuous Function on a Segment is a Uniform Limit of a Polynomial Function Series*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises (in Calculus)* *Whiteboard*
Reading list	*W. J. Kaczor, M. T. Nowak. Problems in Mathematical Analysis I. Real Numbers, Sequences and Series. American Mathematical Society, Providence, RI, 2000.* http://cyclepreparatoire.blogspot.com/2015/10/cours-analyse-prepa-2eme-annee_11.html http://cyclepreparatoire.blogspot.com/2015/10/cours-algebre-prepa-2eme-annee.html https://drive.google.com/file/d/0B2QwIrx6CX_8bDJ6UmlKcmp3Tms/view https://drive.google.com/file/d/0B2QwIrx6CX_8aTI1VEtBRzdmTzg/view https://www.maths-france.fr/MathSup/Cours/index.php https://www.mathprepa.fr/slides-cours-de-2eme-annee/ http://prepa-tunisie.blogspot.com/p/cours-2eme-annee.html *Analyse MP-MP* 2e année: cours et exercices corrigés*

Algebra Module Handbook

Module designation	*Algebra*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P202*
Subtitle, if applicable	
Courses, if applicable	*Algebra*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Firas Feki*
Lecturer	*Dr Firas Feki*
Language	*French*

Relation to curriculum	*This module aims to give students basic knowledge and skills in Algebra. This allows them to have basic tools in Mathematics and to give students foundational ability in accessing and using information that can be applied to more advanced Mathematics courses.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credits/Points	*4.2*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics and basic calculus. In particular, basic knowledge and skills in mathematics courses of 1st year preparatory cycle.*
Module objectives/intended learning outcomes	***Knowledge:*** - *Knows the key definitions of algebraic objects such as groups, rings and fields.* - *To solve problems of simple Inequalities.* - *Students understand matrix algebra rules.* - *Students are able to solve linear systems and to find eigenvalues and eigenvectors.* - *Students have knowledge about orthogonality and projections.* - *Students understand, and are able to solve linear differential equation.* - *Students understand Euclidean Vector Spaces.* - *Students understand Real Pre-Hilbert Spaces and Endomorphism of Euclidean Spaces.* - *Students are able to do Differential calculation.* - *Students are able to solve simple separable and first order linear differential equations.* ***Skills:*** - *Awareness of the importance of differential equations for solving simple applied problems.* - *Practical and technical skill required for physics experimentation and an appreciation of the importance of a systematic approach to experimental measurement.* - *Appreciate how abstract ideas and regions methods in mathematical, such as Differential Calculation and integration, can be applied to important practical problems.* ***Competences:*** - *Ability to plan, execute and report on the results of an investigation using appropriate analysis of the data and associated uncertainties.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to apply the Fundamental theorem of Calculus to solve complex problems.* - *Ability to communicate more confidently.*

Content	*CHAP 1: USUAL ALGEBRAIC STRUCTURES* *1.1. Groups and Subgroups* *1.1.1. Group Homomorphism* *1.1.2. Monogenous and Cyclic Groups* *1.1.3 Order of an Element in a Group* *1.2. Rings* *1.2.1 Ideals of a Commutative Ring* *1.2.2 The Z /n Z Ring* *1.2.3 Rings of Polynomials to an Indeterminate* *CHAP 2: REDUCTION OF ENDOMORPHISM* *2.1. Revision of the Main Algebraic Notions* *2.2. The Elements of a Matrix* *2.2.1. Definitions and Properties of Eigenvalues* *2.2.2. Definitions and Properties of Eigenvectors Polynomials of endomorphism* *2.3. Characteristic Polynomial* *2.3.1. Definition* *2.3.2. Calculation of a Characteristic Polynomial* *2.3.3. Order of Multiplicity of a Eigenvalue* *2.4. Definition of a Split Polynomial* *2.5. Criterion for Diagonalization of a Square Matrix* *2.6. Reduced Form of a Diagonalizable Matrix* *2.7. Endomorphism and Diagonalizable Square Matrices*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises (in Algebra)* *Whiteboard*
Reading list	*W. J. Kaczor, M. T. Nowak. Problems in Mathematical Analysis I. Real Numbers, Sequences and Series. American Mathematical Society, Providence, RI, 2000.* http://cyclepreparatoire.blogspot.com/2015/10/cours-analyse-prepa-2eme-annee_11.html http://cyclepreparatoire.blogspot.com/2015/10/cours-algebre-prepa-2eme-annee.html https://drive.google.com/file/d/0B2QwIrx6CX_8bDJ6UmlKcmp3Tms/view https://drive.google.com/file/d/0B2QwIrx6CX_8aTI1VEtBRzdmTzg/view https://www.maths-france.fr/MathSup/Cours/index.php https://www.mathprepa.fr/slides-cours-de-2eme-annee/ http://prepa-tunisie.blogspot.com/p/cours-2eme-annee.html
Reading list	*Analyse et algèbre: cours de mathématiques de deuxième année avec exercices*

General Physics Module Handbook

Module designation	General Physics
Module level, if applicable	2nd year preparatory cycle
Code, if applicable	*P203*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	Semester 1
Person responsible for the module	Dr Mohamed Ben Mansour
Lecturer	Dr Mohamed Ben Mansour
Language	French
Relation to curriculum	Undergraduate degree program (1st)

Type of teaching, contact hours	*6 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*84 contact hours* *63 Hours of Self Study*
ECTS Credits/Points	*5.88*
Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*Unauthorized documents and internet access.*
Recommended prerequisites	Basic Physics I
Module objectives/intended learning outcomes	- Acquire a good knowledge of the laws of electromagnetism and an understanding of the practical meaning of Maxwell's equations in integral and differential forms. - Assimilate the fundamental concepts and principles of wave phenomena. - Analyze the concepts of interference and diffraction. - Classify the modes of heat transfer. - Discover the Schrodinger equation form and how it is formulated to describe simple physical systems. After successfully completing this course, students are expected to be able to understand fundamental electromagnetic effects in several electromagnetic waves, especially in optical waves. They will also be able to interpret some quantum physics laws, to classify heat transfer modes and to analyze and predict primary fluid flows.
Content	*Chap 1. ELECTROMAGNETISM* - Electromagnetic Induction and Laplace Force - Maxwell's equations; Electromagnetic field energy - Electromagnetic Waves *Chap 2. Heat transfer* - Modes of heat transfer: Conduction, Convection and Radiation.
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	Whiteboard and projectors (Epson)
Reading list	1- D.C. Giancoli, Physics for Scientists and Engineers, Pearson International Edition, Livret de cours 2019-2020 France, 2- I. Zouari, B.Askri, electromagnetism, CPU, Tunis, 2015. 3- R. Langet, Electromagnétisme Class prépa, NATHAN, Paris, 2007. 4- J. Bergua, P. Goulley, I. Pierron, Nouveaux précis, Bréal, Paris, 2004. 5- E. Schrödinger, Introduction et notes par Michel Bitbol, Physique quantique et représentation du monde. Edition du Seuil, la traduction française de l'aricle allemand, 1992.

Engines Technology Module Handbook

Module designation	*Engines Technology*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P204*
Subtitle, if applicable	
Courses, if applicable	*Engines technology*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Tarek Najah*
Lecturer	*Dr Tarek Najah*
Language	*French*
Relation to curriculum	
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Unauthorized documents and internet access.*
Recommended prerequisites	*physics*
Module objectives/intended learning outcomes	***Knowledge:*** - *Know the operating principle of gasoline and diesel engines* - *To know the theoretical cycles of the two engines* - *Calculate the yields of both engines* - *To know the principle of operation of aircraft engines* ***Skills:*** - *Effective technical skills.* - *Problem solving* ***Competences:*** - *Working with tools and technologies* - *Analytical and synthetics spirit*
Content	*Chap 1 GENERAL INTRODUCTION* *1.1 DEFINITIONS* *1.2 CLASSIFICATION* *1.3 PRINCIPLE OF OPERATION* *1.4 CHARACTERISTICS OF AN INTERNAL COMBUSTION ENGINE* *Chap 2 MECHANICALLY POWERED ENGINE SYSTEM* *2.1 CYLINDER BLOCK* *2.2 CYLINDER* *2.3 PROTECTIVE COVER* *2.4 MOVING PARTS OF THE MOTOR* *Chap 3 ENERGY BALANCE OF A HEAT ENGINE* *3.1 MAIN CYCLES OF THE INTERNAL COMBUSTION ENGINE* *3.2 QUANTIFICATION OF PHYSICAL PHENOMENA INVOLVED IN INTERNAL COMBUSTION ENGINES* *Chap 4 ENGINE LUBRICATION*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*

Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Whiteboard, didactic model*
Reading list	*Le moteur thermique (Combustion interne) -LES BASES: TOME 1 Broché – 16 août 2018*

Mechanics Module Handbook

Module designation	*Mechanics*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P206*
Subtitle, if applicable	
Courses, if applicable	*Mechanics*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Olfa Ghorbel Feki*
Lecturer	*Dr Olfa Ghorbel Feki*
Language	*French*
Relation to curriculum	*This is an annual course taught for 2th year classes. It is compulsory for the preparatory cycle. It is in relation with sizing of aircraft structures and fatigue of materials.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Documents are not allowed*
Recommended prerequisites	*beams concept* *solid mechanics*
Module objectives/intended learning outcomes	***Knowledge:*** - *The objective of this course is to contribute to the acquisition of a basic scientific culture allowing a better understanding of the laws of motion and mastery in the use of mechanical tools.* - *Each chapter opens with a description of the objectives and skills to be covered. The introduction of each concept is accompanied by a brief evolution over time, so that the student can relate the most important events in the history of mechanics.* - *In accordance with the description of the mechanics of non-deformable solid systems, the course is divided into four chapters: Mass geometry, solid kinetics, solid dynamics and RDM calculation.* ***Skills:*** *- be able to do calculations of verification and sizing of the various elements* *- be able to do certain calculations (difficult to do analytically)*

Content	*CHAP 1: MASS GEOMETRY* *1.1. Density - Mass* *1.2. Centre of gravity* *1.3. Moments and products of inertia of a solid* *1.4. Principle of conservation of the mass* *CHAP 2: SOLID KINETICS* *2.1. Definitions* *2.2. Kinetic Moment* *2.3. Kinetic torsor of a material assembly*
Study and examination requirements and forms of examination	*Continuous Evaluations.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluations and Midterm Exam 40%* *Final Exam 60%*
Study and examination requirements and forms of examination	*-Other forms, such as the oral examination, project work, laboratory session or essay writing, are also used.* *Student will receive information about examination and grading at the beginning of each course.*
Media employed	*PC video-projector*
Reading list	

Digital Electronics Module Handbook

Module designation	*Digital Electronics*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P207 and P208*
Subtitle, if applicable	
Courses, if applicable	*Digital Electronics*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Abir Lassoued*
Lecturer	*Dr Abir Lassoued*
Language	*French*
Relation to curriculum	*This module aims to give all the students the same knowledge in digital electronics. This allows them to apply logic theory to develop practical digital electronic applications*
Type of teaching, contact hours	*3 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*42 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*2.52*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*unauthorized calculator, unauthorized documents and internet access*
Recommended prerequisites	*For this course, no pre-requisites are required. Also, knowledge of basic mathematics, basic calculus, and linear algebra will be added advantage.*

Module objectives/intended learning outcomes	***Knowledge:*** - *The students understand the numbering systems: decimal, binary, octal and hexadecimal systems as well as conversion methods between numbering systems.* - *They learn how to treat arithmetic operations on numbers.* - *They understand several numeric codes such as DCB and GRAY codes.* - *They are familiar with the rules and theorems of Boolean algebra.* - *They understand the operation of logic gates.* - *They understand the algebraic representation and simplification of a logical function,* - *They get familiar with the main combinatorial logic circuits used in digital systems (such as: arithmetic circuits, encoders, transcoders ...),* ***Skills:*** - *Students go through the fundamentals of Boolean logic and illustrate how they can apply this theory to hardware to see the physical response on a project board.* - *Students use integrated circuits to understand the process of logic simplification, working through the process of applying the theory, creating logic diagram, and understanding and simplifying the response whilst demonstrating this using hardware.* - *Students use integrated circuits to simulate combinational logic circuits (4-bit parallel binary comparator, adder, Multiplexer...)* - *Students simulate logic theoretically then deployed to a project board for a counter that sends the output to 7 segment displays.* ***Competences:*** - *Students apply logic theory to develop practical, digital electronic applications* - *The students are able to design and develop simple and useful systems* - *They are able to solve complex problems*
Content	*CHAP 1: NUMBER SYSTEMS AND NUMERIC CODES* *1.1 Number systems* *1.2 Basic change* *1.3 Operations in the bases* *1.4 Numeric codes* *CHAP 2: COMBINATORIAL LOGIC: BOOLEAN ALGEBRA AND LOGIC FUNCTIONS* *2.1 Variables and logical functions* *2.2 Basic Boolean algebra Operations and Associated Properties* *2.3 Logic gates* *2.4 Logical function representation* *2.5 Logical function simplification* *CHAP 3 : COMBINATIONAL LOGIC CIRCUITS* *3.1 Combinational circuits Generalities* *3.2 Encoder* *3.3 Decoder* *3.4 Multiplexer* *3.5 Demultiplexer* *3.6 Comparator* *3.7 Adder* *3.8 Subtractor*
Study and examination requirements and forms of examination	*Lab assignements* *A midterm exam.* *A final exam.*

Final grade Calculation	*Lab assignements and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklets for theoretical exercises* *Electronics materials* *Booklets for practical sessions* *Computers* *Internet*
Reading list	*"Electronic logic systems" , by A. E. A. Almaini,* *"Design of Logic Systems", by D. Lewin and D. Protheroe* *The website: http://www.karimbourouni.com/upload/files/Livre%20Exercices%20Instrumentation%202011.pdf*

Chemistry Module Handbook

Module designation	Chemistry
Module level, if applicable	2nd year preparatory cycle
Code, if applicable	*P209*
Subtitle, if applicable	
Courses, if applicable	Chemistry
Semester(s) in which the module is taught	Semester 1
Person responsible for the module	Tijeni Hammedi
Lecturer	Tijeni Hammedi
Language	French
Relation to curriculum	
Type of teaching, contact hours	*2 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*28 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.96*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*unauthorized documents and internet access*
Recommended prerequisites	The student must have basic knowledge of : - Proprieties of the elements of the periodic table. - Thermodynamics therefore of chemical equilibria, chimical potential and redox reactions. - The student needs to also be able to describe all different chemical bondings.
Module objectives/intended learning outcomes	The objectives of the course are to provide the basic knowledge of the structure of crystalline materials. It is also to define and describe the bonding and the properties of ionic, molecular, metallic and covalent network crystalline solids. And to describe the main types of crystalline solids: ionic solids, metallic solids and covalent network solids,

Content	*Theme 1 : Crystallography.* *CHAP 1 : INTRODUCTION OF CRYSTALLOGRAPHY.* 1.1 The solid state of matter : Cristalline solids and amorphous solids. 1.2 Classification of cristalline solids : Crystalline solids are generally classified according the nature of the forces that hold its particles together. 1.3 Properties of solids : Melting temperature, conductivity. 1.4 Basic concepts of crystallography : Lattice, unit cells, lattice planes, Miller indices, crystal systems, Bravais lattices. 1.5 X-ray diffraction : Bragg's law. *CHAP 2 : METALLIC SOLIDS.* 2.1 Constructing crystal structures from packing hard spheres: Stacking sequences, packing densities, interstitial sites. 2.1.1 Face Centered Closed packed structure: FCC (ABCABC). 2.1.2 Hexagonal Closed Packed structure: HCP (ABAB). 2.1.3 The body centered structure: BCC lattice. 2.2 Metallic alloys. 2.2.1 Substitutional alloys. 2.2.2 Interstitial alloys. *CHAP 3 : IONIC SOLIDS* Description of simple ionic structures. 3.1 Sodium chloride (NaCl). 3.2 Zinc blende (ZnS). 3.3 Cesium chloride (CsCl). 3.4 Fluorite (CaF_2). 3.5 Potassium oxide (K_2O). *CHAP 4 : COVALENT MACROMOLECULAR SOLIDS.* Description of two structures 4.1 Diamond structure 4.2 Graphite structure
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Whiteboard*
Reading list	

Computer Science Module Handbook

Module designation	*Computer Science*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P210 and P211*
Subtitle, if applicable	*C++ programming*
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Dr Ines Bouzidi*
Lecturer	*Dr Ines Bouzidi*
Language	*French*
Relation to curriculum	*Students will be able to design, code and solve simple and complex problems.*
Type of teaching, contact hours	*2 hours / week* *Theoretical and supervised works* *Classes of 30 students*

Workload	*42 contact hours* *42 Hours of Self Study*
ECTS Credits/Points	*3.36*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Unauthorized documents and internet access*
Recommended prerequisites	*Knowledge in algorithms is necessary*
Module objectives/intended learning outcomes	*This training allows participants to have a complete overview of the capabilities offered by C++. Each notion is accompanied by theoretical applications, but especially practical ones.* *Indeed, the training is very practical, without ignoring the basic principles that will facilitate adaptation to other programming languages.* *At the end of this training, participants will be able to deepen their knowledge in complete autonomy.* *Many outcomes are expected of this course, including:* ***Knowledge:*** *the students learn to manipulate* - *the students learn to manipulate simple data structures and class hierarchies* - *the students learn how to model algorithms using choice structures and loops* - *the students understand the encapsulation, the inheritance, and the polymorphism* ***Skills:*** - *The students learn how to write programs in C++* - *They know how to read from input and write into an output* - *They get familiar with solving complex problems* ***Competences:*** *The students are able to design and develop simple and useful information systems*
Content	*CHAP 1 General introduction* *CHAP 2 Basic elements of C++* *2.1 Standard input and output* *2.2 Setting the development environment* *2.3 Variables and constants* *2.4 Operators* *2.5 Primitive data types* *CHAP 3 Choice structures: if-else, switch* *CHAP 4 Loops: while, for, do-while* *CHAP 5 Random number generation* *CHAP 6 Functions* *6.1 Declaration and call* *6.2 Parameters* *6.3 Recursive functions* *6.4 Passing parameters by value vs. by reference* *CHAP 7 Arrays: vectors and multidimensional*
Study and examination requirements and forms of examination	*Lab assignements* *A midterm exam.* *A final exam.*
Final grade Calculation	*Lab assignements and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Video projector* *Booklets for practical sessions* *Computers* *Internet*
Reading list	*'Apprendre le C++' by claude delannoy* *'Learn c++' by tutorialspoint*

English Module Handbook

Module designation	*English*
Module level, if applicable	*2nd Year Preparatory Cycle*
Code, if applicable	*P212*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Amira Gara*
Lecturer	*Amira Gara*
Language	*English*
Relation to curriculum	*This module aims to improve students' oral as well as written language skills.* *Some selected lessons contain rich vocabulary related to their field of speciality*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *14 Hours of Self Study*
ECTS Credits/Points	*1.4*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Students must write answers on the sheets provided (fill in the blanks).* *Neither documents nor internet access permitted.*
Recommended prerequisites	*-B2 level of English (General English)* *-Basic knowledge of vocabulary related to Aeronautics and Aviation*
Module objectives/intended learning outcomes	*-Develop practical communication skills in speaking and listening as well as reading and writing* *-Develop fluency and grammatical accuracy* *-Boost the students' confidence in their language skills* *-develop Vocabulary and communicative skills related to Aviation and Aeronautics.* *- students apply requisite knowledge in class conversations and written exercices*
Content	*General English Course:* *Units selected from the student's book: Face to Face Advanced (Cambridge University Press)* *1) Make a good impression* *a) Vocabulary communicating* *b) Time expressions with the Past Simple and Present perfect* *c) Reading: 2 texts about friendships and first meetings* *2) Exceptional people* *a) Reading : A genius explains* *b) Relative clauses with prepositions* *c) Listening: a radio programme* *3) Society and the media* *a) Vocabulary collocations* *b) Reading short paragraphs (newspaper articles)* *c) Phrases referring to future* *d) Listening and speaking (TV programmes)*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*

Media employed	*Face to Face C1 (Advanced level) student's book* *Face to Face C1 (Advanced level) workbook with key* *CD players or Loudspeakers* *Data show* *Interactive Boards*
Reading list	*English Books in general (Advanced Level)* *English Scientific and Business books related to Aviation and Aeronautics.*

Meteorology Module Handbook

Module designation	Meteorology
Module level, if applicable	2nd year preparatory cycle
Code, if applicable	P213
Subtitle, if applicable	
Courses, if applicable	Meteorology
Semester(s) in which the module is taught	Semester 1
Person responsible for the module	KEBAIER Abdelaziz
Lecturer	KEBAIER Abdelaziz
Language	French
Relation to curriculum	First, define what is known about meteorology then during the session, we try with the students: - to study the various fundamental parameters of meteorology - to understand the process of formation of certain phenomena weather - development and interpretation of analysis weather maps and forecasts - the coding and decoding of the meteorological information reported in the various messages used by the pilot and the meteorologist - at the end of this module we try to devote tutorials to know how to develop weather forecasts
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	Unauthorized calculator, unauthorized documents
Recommended prerequisites	Knowledge in mathematics, physics, thermodynamics and mechanical fluid help the student to master the knowledge of meteorology..
Module objectives/intended learning outcomes	***Knowledge:*** Initiation to meteorology for students who want to pursue an aeronautical engineering career or an airline pilot career. Students at the end of the training are supposed to : - Know the different meteorological parameters - Know also the different meteorological phenomena that form in the atmosphere (Name of the phenomenon, process of formation and characteristics) - Explain meteorological messages (name, content and utility) ***Skills:*** - Analysis and synthesises skills ***Competences:*** - Analyze and exploit the weather maps especially for aeronautics - Know the dangerous phenomena for aeronautics - Understand how to develop weather forecasts

Content	*CHAP 1 THE WIND* 1.1 Definition and units 1.2 Wind at surface and at altitude 1.3 Buys-Ballot Rule *CHAP 2 THE CLOUDS* 2.1 Definition 2.2 International Classification of Clouds 2.3 Cloud formation process *CHAP 3 AIR MASSES* 3.1 Definition 3.2 Classification of air masses 3.3 Evolution by cooling at the base 3.4 Evolution by warming at the base *CHAP 4 THUNDERSTORMS AND ASSOCIATED PHENOMENA* 4.1 Definition 4.2 Different types of thunderstorms 4.3 Dangerous phenomena associated with storms *CHAP 5 TURBULENCE* 5.1 Definition 5.2 Different types of aeronautical turbulence 5.3 Intensity of turbulence 5.4 Types of clouds indicating turbulence 5.5 Hazards to Aircraft
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	Data show
Reading list	- Meteorological book Volume 1 and Volume 2 - JEAN MERMOZ - Aeronautical Meteorology book ENAC - General Meteorological book ENM

French Module Handbook

Module designation	*French Communication*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P214*
Subtitle, if applicable	
Courses, if applicable	*French*
Semester(s) in which the module is taught	*Semester 1*
Person responsible for the module	*Rym Mansour*
Lecturer	*Rym Mansour*
Language	*French*
Relation to curriculum	*This module introduces topography, geomatics and aeronautics terminology and vocabulary and it focuses on basic knowledge of French grammar*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *14 Hours of Self Study*
ECTS Credits/Points	*1.4*
Weight Factor/Coefficient	*1.5*

Requirements according to the examination regulations	*Unauthorized documents*
Recommended prerequisites	*Students should have B1 (according to CEFR) in French language*
Module objectives/intended learning outcomes	***Knowledge**:* - *Students are introduced with key words and vocabulary related to aviation and geomatics.* ***Competences**:* - *Students must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They do oral reading practice in the vocabulary and the key sentences.* - *They read interesting and relevant authentic texts from newspaper articles and website related to aeronautic znd geomatics fields.* - *They must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They should be able to use correct and accurate concepts of the French grammar* - *They revise important grammar structures and functions* - *They review their mistakes and understand the grammar points with explanations by the instructor* - *Students should be able to make oral presentations and to handle oral conversations.* ***Skills:*** - *They learn how to use effectively and correctly new aviation and geomatics words in sentences and paragraphs which enables them to improve their writing skills.* - *They practice and develop their reading skills throw drills of target language.* - *They learn how to develop their listening and reading skills.* - *In class, they develop their awareness of the common problem areas at their level. They focus on accuracy and knowledge of key areas of grammar.* - *They learn how to develop their communication skills.*

Content	*CHAP 1: GRAMMAR LESSON THE ADJECTIVE QUALIFYING formation of the qualifying adjective of the feminine, formation of the plural and emphasizing the adjective of the adjective with several nouns* *CHAP 2: STUDY OF A PRESS FILE ENTITLED "PLANNING APPLICATIONS: MAPPING ECOLOGICAL ZONES, MONITORING DEFORESTATION, MONITORING URBAN LAND USE. Introduction to the terminologies used in the French language in the field of the ecology and mapping.* *CHAP 3: STUDY OF A PRESS ARTICLE ENTITLED:" ROBOT HELICOPTERS IN THE AFGHAN SKIES"* *Introduction to terminologies in use in French in the field of helicopter.* *CHAP 4: THE DISCOVERY OF AIRPORT RUNWAYS: Introduction to the terminologies used in the French language in the range of aircraft tracks length, width kind, bitumen, asphalt, comparison orientation between several tracks with illustration by photos.* *CHAP 5: LESSON OF GRAMMAR: PERSONAL PRONOUNS: case study and examples of the kind of personal pronouns functions and highlighting of neutral pronouns and place of personal pronoun subject.* *CHAP 6: PUBLIC COMMUNICATION TECHNIQUES: introduce the students to the rules of communication in public the speech the gestures the information chosen the setting of the audience and the preliminary preparation* *CHAP 7: GRAMMAR LESSON THE PRONOUNS AND INTERROGATIVE ADJECTIVES:* *Introduce students to the forms of interrogative pronouns and their uses and functions and the forms of the interrogative and exclamatory adjective* *CHAP 8: STUDY OF A PRESS ARTICLE ENTITLED "A PLANE TURNS AROUND TO AVOID OVERTIME"* *Introduction to the terminologies used in the French language in the aeronautical safety and aerial work legislation.* *CHAP 9: STUDY OF A PRESS ARTICLE ENTITLED "FRANCE FINALLY HAS ITS DRONES":* *Introduction to terminologies in use in French in military drones.* *CHAP 10: PRESENTATIONS BY STUDENTS IN THE FIELD OF TOPOGRAPHY: Use of French terminology terminologies in the field of presentations as well as the answers to questions asked* *CHAP 11 and CHAP 12: presentations by students on the activities of an airport chosen by themselves: The oral techniques of the presentations: vocabulary used with illustration of the non-verbal gestures valuing balance of the individual competences*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Computers* *Internet*

Reading list	*Newspapers: "Le Monde", "Le Figaro", "La Presse"* *Web sites: www.lesechos.fr* *www.air-journal.fr* *www.journal-aviation.com* *console.vpaper.ca/géomatique* *https://www.sigtv.fr/*

A1.5 Semester 4 Modules' Handbook

Calculus Module Handbook

Module designation	*Calculus*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P201*
Subtitle, if applicable	
Courses, if applicable	*Calculus*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Firas Feki*
Lecturer	*Dr Firas Feki*
Language	*French*
Relation to curriculum	*This module aims to give students basic knowledge and skills in Calculus. This allows them to have basic tools in Mathematics and to give students foundational ability in accessing and using information that can be applied to more advanced Mathematics courses.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credits/Points	*4.2*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics and basic calculus. In particular, basic knowledge and skills in mathematics courses of 1st year preparatory cycle.*
Module objectives/intended learning outcomes	***Knowledge:*** - *Give basic properties and results related to topological spaces and algebraic topology.* - *Describe and give examples of the metric topology and the quotient topology and be able to deduce the basic properties of these topologies.* - *Give the definition of concepts related to metric spaces, such as continuity, compactness, completeness and connectedness.* - *Answer question concerning uniform convergence of concrete numerical sequences and series.* - *Students are able to use integration techniques.* ***Skills:*** - *Awareness of the importance of differential equations for solving simple applied problems.* - *Practical and technical skill required for physics experimentation and an appreciation of the importance of a systematic approach to experimental measurement.* - *Appreciate how abstract ideas and regions methods in mathematical, such as Differential Calculation and integration, can be applied to important practical problems.*

	Competences: - *Ability to plan, execute and report on the results of an investigation using appropriate analysis of the data and associated uncertainties.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to apply the Fundamental theorem of Calculus to solve complex problems.* - *Ability to communicate more confidently.*
Content	*CHAP 1: GENERALIZED INTEGRALS* *1.1. Convergence Definition of a Generalized Integral on an Unbounded Interval* *1.2. Integrability Definition of a Function Over an Unbounded Interval* *1.3. Integration of Positive Functions on an Unbounded Interval* *1.3.1. Characterization of the Convergence of the Integral* *1.3.2. Integrals of Reference: Integral of Riemann* *1.3.3. Comparison Rules for Positive Functions* *1.4. Linearity of the Integral, Positivity of the Integral, Chasles' Relationship, Triangle Inequality* *1.5. Series-Integral Comparison* *1.6. Integration by Parts* *1.7. Integration by Substitution* *1.8. Passage to the Limit Below the Integral of a Series of Functions* *1.8.1. Dominated Convergence Theorem* *1.8.2. Integration Theorem for a Function Series* *CHAP 2: POWER SERIES* *2.1. Overview* *2.1.1. Lemma of Abel* *2.1.2. Definition and Properties of the Convergence Radius (Absolute Convergence, Normal Convergence, Uniform Convergence)* *2.1.3. Convergence Radius Calculations* *2.1.3.1. Examples* *2.1.3.2. D'Alembert's Ratio Test* *2.1.3.3. Comparison Rules* *2.2. Sum Properties of an Entire Series* *2.2.1. Continuity of the Sum of a Power Series* *2.2.2. Derivation of a Power Series* *2.2.3. Integration of a Power Series* *2.3. Sum and Cauchy Product of two Power Series* *2.4. Developable Functions in Power Series* *2.4.1. Usual Developments* *2.4.2. Function Developable in Power Series near 0* *2.4.3. Power Series Development and Operations* *2.4.4. Taylor Series of a Real Variable Function* *2.4.5. Development of Real Variable Functions*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises (in Calculus)* *Whiteboard*

Reading list	*W. J. Kaczor, M. T. Nowak. Problems in Mathematical Analysis I. Real Numbers, Sequences and Series. American Mathematical Society, Providence, RI, 2000.* http://cyclepreparatoire.blogspot.com/2015/10/cours-analyse-prepa-2eme-annee_11.html http://cyclepreparatoire.blogspot.com/2015/10/cours-algebre-prepa-2eme-annee.html https://drive.google.com/file/d/0B2QwIrx6CX_8bDJ6UmlKcmp3Tms/view https://drive.google.com/file/d/0B2QwIrx6CX_8aTI1VEtBRzdmTzg/view https://www.maths-france.fr/MathSup/Cours/index.php https://www.mathprepa.fr/slides-cours-de-2eme-annee/ http://prepa-tunisie.blogspot.com/p/cours-2eme-annee.html *Analyse MP-MP* 2e année: cours et exercices corrigés* https://books.google.tn/books?id=98vgoQEACAAJ&dq=maths+pour+pr%C3%A9pa+2%C3%A9me&hl=fr&sa=X&ved=0ahUKEwjCxZ6S4ZXmAhVi6uAKHSVeD_wQ6AEIJTAA

Algebra Module Handbook

Module designation	*Algebra*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P202*
Subtitle, if applicable	
Courses, if applicable	*Algebra*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Firas Feki*
Lecturer	*Dr Firas Feki*
Language	*French*
Relation to curriculum	*This module aims to give students basic knowledge and skills in Algebra. This allows them to have basic tools in Mathematics and to give students foundational ability in accessing and using information that can be applied to more advanced Mathematics courses.*
Type of teaching, contact hours	*4.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*63 contact hours* *42 Hours of Self Study*
ECTS Credits/Points	*4.2*
Weight Factor/Coefficient	*3*
Requirements according to the examination regulations	*Unauthorized calculator, unauthorized documents and internet access.*
Recommended prerequisites	*Some knowledge of basic mathematics and basic calculus. In particular, basic knowledge and skills in mathematics courses of 1st year preparatory cycle.*

Module objectives/intended learning outcomes	***Knowledge:*** - *Knows the key definitions of algebraic objects such as groups, rings and fields.* - *To solve problems of simple Inequalities.* - *Students understand matrix algebra rules.* - *Students are able to solve linear systems and to find eigenvalues and eigenvectors.* - *Students have knowledge about orthogonality and projections.* - *Students understand, and are able to solve linear differential equation.* - *Students understand Euclidean Vector Spaces.* - *Students understand Real Pre-Hilbert Spaces and Endomorphism of Euclidean Spaces.* - *Students are able to do Differential calculation.* - *Students are able to solve simple separable and first order linear differential equations.* ***Skills:*** - *Awareness of the importance of differential equations for solving simple applied problems.* - *Practical and technical skill required for physics experimentation and an appreciation of the importance of a systematic approach to experimental measurement.* - *Appreciate how abstract ideas and regions methods in mathematical, such as Differential Calculation and integration, can be applied to important practical problems.* ***Competences:*** - *Ability to plan, execute and report on the results of an investigation using appropriate analysis of the data and associated uncertainties.* - *Ability to use spreadsheets and mathematical packages to calculate and graph mathematical equations.* - *Ability to apply the Fundamental theorem of Calculus to solve complex problems.* *Ability to communicate more confidently.*
Content	*CHAP 1: LINEAR DIFFERENTIAL EQUATIONS* *1.1. Overview* *1.2. Solutions of a Linear Differential Equation* *1.3. Homogeneous Linear Differential Systems with Constant Coefficients* *1.4. Method of Variation of Constants* *1.5. Second Order Scalar Differential Equations* *CHAP 2: EUCLIDEAN VECTOR SPACES* *2.1. Positive Definite Symmetric Bilinear Form* *2.2. Scalar Product and Applications* *2.3. Definition of an Euclidean Vector Space* *2.4. Definition of a Euclidean Norm* *2.5. Relations between Norms and Scalar Products* *2.6. Cauchy–Schwarz Inequality and Applications* *2.7. Triangle Inequality* *2.8. Definition of an Euclidean Distance* *2.9. Orthogonality* *2.9.1. Orthogonal Family* *2.9.2. Orthonormal Basis* *2.9.3. Gram-Schmidt Orthonormalization Process* *2.9.4. Orthogonal Projection*

	CHAP 3: REAL PRE-HILBERT SPACES: ENDOMORPHISM OF EUCLIDEAN SPACES *3.1. Orthogonal Projection on a Sub-Space of Finite Dimension* *3.2. Orthonormal Vector Sequences of a Real Pre-Hilbert Space* *3.3. Symmetrical Endomorphism of a Euclidean Space* *3.4. Vectorial Isometry of an Euclidean Space* *CHAP 4: DIFFERENTIAL CALCULATION* *4.1. Derivative According to a Vector, Partial Derivatives* *4.2. Differential* *4.3. Operations on Differentiable Applications* *4.4. Case of Numerical Applications* *4.5. Vectors Tangent to a Part of a Normed Space of Finite Dimension* *4.6. Applications of Class C1* *4.7. Applications of Class Ck* *4.8. Extremum of a Numerical Function*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Booklets for theoretical exercises (in Algebra)* *Whiteboard*
Reading list	*W. J. Kaczor, M. T. Nowak. Problems in Mathematical Analysis I. Real Numbers, Sequences and Series. American Mathematical Society, Providence, RI, 2000.*
Reading list	*W. J. Kaczor, M. T. Nowak. Problems in Mathematical Analysis I. Real Numbers, Sequences and Series. American Mathematical Society, Providence, RI, 2000.* http://cyclepreparatoire.blogspot.com/2015/10/cours-analyse-prepa-2eme-annee_11.html http://cyclepreparatoire.blogspot.com/2015/10/cours-algebre-prepa-2eme-annee.html https://drive.google.com/file/d/0B2QwIrx6CX_8bDJ6UmlKcmp3Tms/view https://drive.google.com/file/d/0B2QwIrx6CX_8aTI1VEtBRzdmTzg/view https://www.maths-france.fr/MathSup/Cours/index.php https://www.mathprepa.fr/slides-cours-de-2eme-annee/ http://prepa-tunisie.blogspot.com/p/cours-2eme-annee.html *Analyse et algèbre: cours de mathématiques de deuxième année avec exercices* https://books.google.tn/books?id=Ihh2uOXnRQcC&pg=PR7&dq=maths+alg%C3%A8bre+pour+pr%C3%A9pa+2%C3%A9me&hl=fr&sa=X&ved=0ahUKEwiO95jL6JXmAhUPkxQKHSS3BrsQ6AEIJTAA#v=onepage&q=maths%20alg%C3%A8bre%20pour%20pr%C3%A9pa%202%C3%A9me&f=false

General Physics Module Handbook

Module designation	General Physics
Module level, if applicable	2nd year preparatory cycle
Code, if applicable	*P203*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	Semester 2
Person responsible for the module	Dr Mohamed Ben Mansour
Lecturer	Dr Mohamed Ben Mansour
Language	French
Relation to curriculum	Undergraduate degree program (1st)
Type of teaching, contact hours	*6 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*84 contact hours* *63 Hours of Self Study*
ECTS Credits/Points	*5.88*
Weight Factor/Coefficient	*4*
Requirements according to the examination regulations	*Unauthorized documents and internet access.*
Recommended prerequisites	Basic Physics I
Module objectives/intended learning outcomes	- Acquire a good knowledge of the laws of electromagnetism and an understanding of the practical meaning of Maxwell's equations in integral and differential forms. - Assimilate the fundamental concepts and principles of wave phenomena. - Analyze the concepts of interference and diffraction. - Classify the modes of heat transfer. - Discover the Schrodinger equation form and how it is formulated to describe simple physical systems. After successfully completing this course, students are expected to be able to understand fundamental electromagnetic effects in several electromagnetic waves, especially in optical waves. They will also be able to interpret some quantum physics laws, to classify heat transfer modes and to analyze and predict primary fluid flows.
Content	*Chap 1. physical optics (wave optics)* - Diffraction and Interference - Grating Spectroscopic Properties; angular dispersion *Chap 2. fluid dynamics* - Lagrangian and Eulerian description - Ideal and real fluids - Fluid dynamics *Chap 3 Quantum Physics* - wave-particle duality - Plank-Eintein relation
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	Whiteboard and projectors (Epson)

Reading list	1- D.C. Giancoli, Physics for Scientists and Engineers, Pearson International Edition, Livret de cours 2019-2020 France, 2- I. Zouari, B.Askri, electromagnetism, CPU, Tunis, 2015. 3- R. Langet, Electromagnétisme Class prépa, NATHAN, Paris, 2007. 4- J. Bergua, P. Goulley, I. Pierron, Nouveaux précis, Bréal, Paris, 2004. 5- E. Schrödinger, Introduction et notes par Michel Bitbol, Physique quantique et représentation du monde. Edition du Seuil, la traduction française de l'aricle allemand, 1992.

Engines Technology Module Handbook

Module designation	Engines Technology
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P204*
Subtitle, if applicable	
Courses, if applicable	*Engines technology*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Tarek Najah*
Lecturer	*Dr Tarek Najah*
Language	*French*
Relation to curriculum	
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Unauthorized documents and internet access.*
Recommended prerequisites	*physics*
Module objectives/intended learning outcomes	***Knowledge:*** - *Know the operating principle of gasoline and diesel engines* - *To know the theoretical cycles of the two engines* - *Calculate the yields of both engines* - *To know the principle of operation of aircraft engines* ***Skills:*** - *Effective technical skills.* - *Problem solving* ***Competences:*** - *Working with tools and technologies* - *Analytical and synthetics spirit*

Content	*CHAP 1 COOLING SYSTEM* *1.1 PURPOSE OF THE SYSTEM* *1.2 USED PRINCIPALS: Cooling by air, cooling by water* *CHAP 2 IGNITION SYSTEM* *CHAP 3 FUEL SYSTEM AND CARBURATION* *3.1 FUEL SYSTEM: Diesel engine, petrol engine* *3.2 AIR CIRCUIT: Intake circuit, Exauhst system* *CHAP 4 TURBOMACHINERY* *4.1 DEFINITION* *4.2 CLASSIFICATION* *4.3 CONSTITUTION OF TURBOMACHINES* *4.4 TURBOJET AND TURBOPROP* *CHAP 5 TURBOJET SUBSYSTEMS*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Whiteboard, didactic model*
Reading list	- *Le moteur thermique (Combustion interne) -LES BASES: TOME 1 Broché – 16 août 2018*

Mechanics Module Handbook

Module designation	*Mechanics*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P206*
Subtitle, if applicable	
Courses, if applicable	*Mechanics*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Ismail Yousfi*
Lecturer	*Ismail Yousfi*
Language	*French*
Relation to curriculum	*This is an annual course taught for 2th year classes. It is compulsory for the preparatory cycle. It is in relation with sizing of aircraft structures and fatigue of materials.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Documents are not allowed*
Recommended prerequisites	*beams concept* *solid mechanics*

Module objectives/intended learning outcomes	***Knowledge:*** - *The objective of this course is to contribute to the acquisition of a basic scientific culture allowing a better understanding of the laws of motion and mastery in the use of mechanical tools.* - *Each chapter opens with a description of the objectives and skills to be covered. The introduction of each concept is accompanied by a brief evolution over time, so that the student can relate the most important events in the history of mechanics.* - *In accordance with the description of the mechanics of non-deformable solid systems, the course is divided into four chapters: Mass geometry, solid kinetics, solid dynamics and RDM calculation.* ***Skills:*** *-be able to do calculations of verification and sizing of the various elements* *-be able to do certain calculations (difficult to do analytically)*
Content	*DYNAMICS OF SOLIDS* *1.1. Definitions* *1.2. Dynamic Resultant* *1.3. Dynamic Moment* *1.4. Dynamic Torsor* *1.5. Fundamental principle of dynamics* *1.6. Power developed by external mechanical action applied to a solid* *1.7. Kinetic energy theorem*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*P-C video-projector*
Reading list	

Digital Electronics Module Handbook

Module designation	*Digital Electronics*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P207 and P208*
Subtitle, if applicable	
Courses, if applicable	*Digital Electronics*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Abir Lassoued*
Lecturer	*Dr Abir Lassoued*
Language	*French*
Relation to curriculum	*This module aims to give all the students the same knowledge in digital electronics. This allows them to apply logic theory to develop practical digital electronic applications*

Type of teaching, contact hours	*3 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*42 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*2.52*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*unauthorized calculator, unauthorized documents and internet access*
Recommended prerequisites	*For this course, no pre-requisites are required. Also, knowledge of basic mathematics, basic calculus, and linear algebra will be added advantage.*
Module objectives/intended learning outcomes	***Knowledge:*** *Students learn simple digital logic theory* - *The students understand the sequential systems.* - *They understand latches and Flip-Flops.* - *They understand the different types of counter and operating principle of each type.* - *They understand the different types of register* ***Skills:*** - *Students go through the fundamentals of Boolean logic and illustrate how they can apply this theory to hardware to see the physical response on a project board.* - *Students use integrated circuits to understand the process of logic simplification, working through the process of applying the theory, creating logic diagram, and understanding and simplifying the response whilst demonstrating this using hardware.* - *Students use integrated circuits to simulate combinational logic circuits (4-bit parallel binary comparator, adder, Multiplexer...)* - *Students simulate logic theoretically then deployed to a project board for a counter that sends the output to 7 segment displays.* ***Competences:*** - *Students apply logic theory to develop practical, digital electronic applications* - *The students are able to design and develop simple and useful systems* - *They are able to solve complex problems*

Content	*CHAP 1: SEQUENTIAL CIRCUITS: LATCHES AND FLIP-FLOPS* *1.1. Introduction* *1.2. SR latch* *1.3. Gated SR latch* *1.4. D latch* *1.5. JK flip-flop* *1.6. Toggle flip-flop* *1.7. Working of flip-flops* *1.8. Master-slave flip-flop* *CHAP 2: SEQUENTIAL CIRCUITS: COUNTERS, DOWN-COUNTERS AND WORKING* *2.1. Asynchronous counters / down-counters* *2.2. Synchronous counters / down-counters* *CHAP 3: SEQUENTIAL CIRCUITS: REGISTERS AND WORKING* *3.1. Definition* *3.2. Memory registers* *3.3. Shift registers* ***Workshop Digital Electronics*** *W1. The purpose of this manipulation is to become familiar with the basic circuits of combinational logic by dealing with simple examples and wiring some functions.* *W2. The purpose of this manipulation is to become familiar with combinational circuits by realizing and wiring some logical functions based on basic logic gates.* *W.3 The purpose of this manipulation is to study the main combinatorial logic circuits used in digital systems, in particular the adder, and to perform logic functions using combinational circuits.* *W4. The purpose of this manipulation is to study the operating principles of a comparator and in particular the integrated circuit 7485.* *W5. This manipulation allows an introduction to basic circuits such as RS, D, JK flip-flops. Counter application will be carried out.*
Study and examination requirements and forms of examination	*Lab Assignments.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Lab Assignments and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Booklets for theoretical exercises* *Electronics materials* *Booklets for practical sessions* *Computers* *Internet*
Reading list	*"Electronic logic systems" , by A. E. A. Almaini,* *"Design of Logic Systems", by D. Lewin and D. Protheroe* *The website: http://www.karimbourouni.com/upload/files/Livre%20Exercices%20Instrumentation%202011.pdf*

Chemistry Module Handbook

Module designation	Chemistry
Module level, if applicable	2nd year preparatory cycle
Code, if applicable	*P209*
Subtitle, if applicable	
Courses, if applicable	Chemistry
Semester(s) in which the module is taught	Semester 2
Person responsible for the module	Tijeni Hammedi
Lecturer	Tijeni Hammedi
Language	French
Relation to curriculum	
Type of teaching, contact hours	*2hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*28 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.96*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	- The use of non-programmable electronic calculators is permitted - No documents allowed
Recommended prerequisites	The student must have basic knowledge of : - Proprieties of the elements of the periodic table. - Thermodynamics therefore of chemical equilibria, chimical potential and redox reactions. - The student needs to also be able to describe all different chemical bondings.
Module objectives/intended learning outcomes	By the end of this theme, student will be able to: - Explain the construction and use of a typical phase diagram. - Use phase diagrams to identify stable phases at given temperatures and pressures, and to describe phase transitions resulting from changes in these properties.
Module objectives/intended learning outcomes	-To show the directions of various reactions at given pH and potential. -To make a basis for estimation of the corrosion product compositions at various pH and potential combinations. -To show which environmental pH and potential changes will reduce or prevent corrosion.

Content	*CHAP 1 : ONE COMPONENT PHASE DIAGRAMS.* 1.1. Gibbs phase rule. 1.2. Clapeyron equation 1.3. Clausius Clapeyron equation. 1.4. Examples diagram of water and diagram of carbon dioxide. *CHAP 2 : LIQUID VAPOR EQUILIBRIUM FOR TWO COMPONENT SYSTEMS.* 2.1. Definition : Phases, gaseous state, liquid state, homogeous solutions, immiscible liquids, solids state, crystalline phases, solid solutions, chemical potentials, degrees of freedom. 2.2. Total miscibility in the liquid state. 2.3. System of two partially miscible liquids. 2.4. Non miscibility in the liquid state. *CHAP 3 : SOLID LIQUID EQUILIBRIUM FOR TWO COMPONENT SYSTEMS.* 3.1. Total miscibility in the solid and liquid state. 3.2. Eutectic systems. 3.3. Eutectic systems with partial solid sotution. 3.4. Binary systems with intermidiate compounds. *CHAP 4 : POTENTIAL-PH DIAGRAMS POURBAIX DIAGRAM.* 4.1. Thermodynamic review. 4.2. Characteristics of a Pourbaix diagram. 4.3. Constructing a Pourbaix diagram. 4.4. Interpretation of the Pourbaix diagram. 4.5. Limitation of Pourbaix diagram. *CHAP5 : CURRENT POTENTIAL CURVES 7* 5.1. Kinetics at equilibrium. 5.2. Current potential curve shapes.
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	
Reading list	

Computer Science Module Handbook

Module designation	*Computer Science*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P210 and P211*
Subtitle, if applicable	*C++ programming*
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Bouzidi Ines*
Lecturer	*Dr Bouzidi Ines*
Language	*French*
Relation to curriculum	*Students will be able to design code and solve simple and complex problems.*
Type of teaching, contact hours	*3 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*42 contact hours* *42 Hours of Self Study*
ECTS Credits/Points	*3.36*
Weight Factor/Coefficient	*2*

Requirements according to the examination regulations	*Unauthorized documents and internet access*
Recommended prerequisites	*Knowledge in algorithms is necessary*
Module objectives/intended learning outcomes	*This training allows participants to have a complete overview of the capabilities offered by C++. Each notion is accompanied by theoretical applications, but especially practical ones.* *Indeed, the training is very practical, without ignoring the basic principles that will facilitate adaptation to other programming languages.* *At the end of this training, participants will be able to deepen their knowledge in complete autonomy.* *Many outcomes are expected of this course, including:*
Module objectives/intended learning outcomes	*Knowledge: the students learn to manipulate* - *the students learn to manipulate simple data structures and class hierarchies* - *the students learn how to model algorithms using choice structures and loops* - *the students understand the encapsulation, the inheritance, and the polymorphism* *Skills:* - *The students learn how to write programs in C++* - *They know how to read from input and write into an output* - *They get familiar with solving complex problems* *Competences:* - *The students are able to design and develop simple and useful information systems*
Content	*CHAP 1 String manipulation* *CHAP2 Object Oriented programming* *2.1. Classes and objects* *2.2. Attributes (simple types and objects)* *2.3. Methods, overloading, constructors, overloading operators* *2.4. Manipulating arrays of objects* *CHAP 3 Inheritance* *3.1. Method redefinition* *3.2. Visibility* *3.3. Polymorphism*
Study and examination requirements and forms of examination	*Lab Assignments.* *A midterm exam.* *A final exam.*
Final grade Calculation	*Lab Assignments and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Video projector, Booklets for practical sessions* *Computers , Internet*
Reading list	*'Apprendre le C++' by claude delannoy* *'Learn c++' by tutorialspoint*

English Module Handbook

Module designation	*English*
Module level, if applicable	*2nd Year Preparatory Cycle*
Code, if applicable	*P212*
Subtitle, if applicable	
Courses, if applicable	
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Amira Gara*
Lecturer	*Amira Gara*
Language	*English*
Relation to curriculum	*This module aims to improve students' oral as well as written language skills.* *Some selected lessons contain rich vocabulary related to their field of speciality*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *14 Hours of Self Study*
ECTS Credits/Points	*1.4*
Weight Factor/Coefficient	*2*
Requirements according to the examination regulations	*Students must write answers on the sheets provided (fill in the blanks).* *Neither documents nor internet access permitted.*
Recommended prerequisites	*-B2 level of English (General English)* *-Basic knowledge of vocabulary related to Aeronautics and Aviation*
Module objectives/intended learning outcomes	*-Develop practical communication skills in speaking and listening as well as reading and writing* *-Develop fluency and grammatical accuracy* *-Boost the students' confidence in their language skills* *-develop Vocabulary and communicative skills related to Aviation and Aeronautics.* *- students apply requisite knowledge in class conversations and written exercices*
Content	*<u>Business English:</u>* *Units selected from the student's book English for Aviation (Oxford University Press)*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*English For Aviation student's book (Oxford University Press)* *CD players or Loudspeakers* *Data show* *Interactive Boards*
Reading list	*English Books in general (Advanced Level)* *English Scientific and Business books related to Aviation and Aeronautics.*

French Module Handbook

Module designation	*French*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P214*
Subtitle, if applicable	
Courses, if applicable	*French*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Rym Mansour*
Lecturer	*Rym Mansour*
Language	*French*
Relation to curriculum	*This module introduces aeronautics and geomatics terminology and vocabulary and it focuses on basic knowledge of French grammar*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *14 Hours of Self Study*
ECTS Credits/Points	*1.4*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*Not authorized documents*
Recommended prerequisites	*Students should have B1 (according to CEFR) in French language*
Module objectives/intended learning outcomes	***Knowledge**:* - *Students are introduced with key words and vocabulary related to aviation and geomatics.* ***Competences**:* - *Students must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They do oral reading practice in the vocabulary and the key sentences.* - *They read interesting and relevant authentic texts from newspaper articles and website related to aeronautic and geomatics fields* - *They must be able to use the vocabulary learnt in class, and related to their field of study in appropriate situations.* - *They should be able to use correct and accurate concepts of the French grammar* - *They revise important grammar structures and functions* - *They review their mistakes and understand the grammar points with explanations by the instructor* - *Students should be able to make oral presentations and to handle oral conversations.*

	Skills: - *They learn how to use effectively and correctly new aviation words in sentences and paragraphs which enables them to improve their writing skills.* - *They practice and develop their reading skills throw drills of target language.* - *They learn how to develop their listening and reading skills.* - *In class, they develop their awareness of the common problem areas at their level. They focus on accuracy and knowledge of key areas of grammar.* - *They learn how to develop their communication skills.*
Content	*CHAP 1: GRAMMAR LESSON THE ADJECTIVE QUALIFYING* *formation of the qualifying adjective of the feminine, formation of the plural and emphasizing the adjective of the adjective with several nouns* *CHAP 2: STUDY OF A PRESS FILE ENTITLED " PRECISION AIR SERVICES COMMAND ATR 42 600"* *Introduction to the terminologies used in the French language in the field of the motorization of aircraft and those used in Tunisia ATR.* *CHAP 3: STUDY OF A PRESS ARTICLE ENTITLED:" ROBOT HELICOPTERS IN THE AFGHAN SKIES"* *Introduction to terminologies in use in French in the field of helicopter.* *CHAP 4: THE DISCOVERY OF AIRPORT RUNWAYS: Introduction to the terminologies used in the French language in the range of aircraft tracks length, width kind, bitumen, asphalt, comparison orientation between several tracks with illustration by photos.* *CHAP 5: LESSON OF GRAMMAR: PERSONAL PRONOUNS: case study and examples of the kind of personal pronouns functions and highlighting of neutral pronouns and place of personal pronoun subject* *CHAP 6: PUBLIC COMMUNICATION TECHNIQUES: introduce the students to the rules of communication in public the speech the gestures the information chosen the setting of the audience and the preliminary preparation* *CHAP 7: GRAMMAR LESSON THE PRONOUNS AND INTERROGATIVE ADJECTIVES:* *Introduce students to the forms of interrogative pronouns and their uses and functions and the forms of the interrogative and exclamatory adjective* *CHAP 8: STUDY OF A PRESS ARTICLE ENTITLED "A PLANE TURNS AROUND TO AVOID OVERTIME"* *Introduction to the terminologies used in the French language in the aeronautical safety and aerial work legislation.*

	CHAP 9: STUDY OF A PRESS ARTICLE ENTITLED "FRANCE FINALLY HAS ITS DRONES": *Introduction to terminologies in use in French in military drones.* *CHAP 10: PRESENTATIONS BY STUDENTS ON THE ACTIVITIES OF AN AIRPORT CHOSEN BY THEMSELVES:* *Use of French terminology terminologies in the field of presentations as well as the answers to questions asked* *CHAP 11 and CHAP 12: presentations by students on the activities of an airport chosen by themselves: The oral techniques of the presentations: vocabulary used with illustration of the non-verbal gestures valuing balance of the individual competences*
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Computers* *Internet*
Reading list	*Newspapers: "Le Monde", "Le Figaro", "La Presse"* *Web sites: www.lesechos.fr* *www.air-journal.fr* *www.journal-aviation.com* *console.vpaper.ca/géomatique* *https://www.sigtv.fr/*

Introduction to Geographic Information System Module Handbook

Module designation	*Introduction to geographic information system*
Module level, if applicable	*2nd year preparatory cycle*
Code, if applicable	*P214*
Subtitle, if applicable	
Courses, if applicable	*Introduction to geographic information system*
Semester(s) in which the module is taught	*Semester 2*
Person responsible for the module	*Dr Khaled Bouzid*
Lecturer	*Dr Khaled Bouzid*
Language	*French*
Relation to curriculum	*This course introduces geographic information system for the student of preparatory cycle. It give the fundamental of GIS with is a multi-component environment used to create, manage, visualize and analyse data and its spatial counterpart.*
Type of teaching, contact hours	*1.5 hours / week* *Theoretical and supervised works* *Classes of 30 students*
Workload	*21 contact hours* *21 Hours of Self Study*
ECTS Credits/Points	*1.68*
Weight Factor/Coefficient	*1.5*
Requirements according to the examination regulations	*unauthorized calculator, unauthorized documents and internet access*
Recommended prerequisites	*For this course, no pre-requisites are required.*

Module objectives/intended learning outcomes	***Knowledge:*** - *The students understand the definition of GIS and Concept of geographic data* - *They understand the evolution of GIS.* - *They understand the spatial data structures.* - *They understand how to get the different type of data: raster and vector data,* - *They understand the utility of spatial data with some samples.* - *The students understand the geographic coordinates system.* - *They understand the main maps projections.* - *They understand the different types of maps* - *They understand Fundamentals of remote sensing* ***Skills and Competences:*** - *Student will be able to define GIS and components* - *Student will be able to understand data models and structure of geographic information system.* - *Student will be able to classify spatial data to vector and raster data.* - *Student understands the utility of GIS and all the new spatial technology.*
Content	*CHAP 1: INTRODUCTION TO GIS* 1.1. Definition of GIS 1.2. Concept of geographic data 1.3. Functions of a GIS 1.4. History and evolution of GIS 1.5. Importance of GIS in Autonomous Communities 1.6. Applications of GIS in Autonomous Communities *CHAP 2: COMPONENTS OF A GIS* 2.1. Hardware/ Software 2.2. Data 2.3. Procedures 2.4. Human team *CHAP 3: SPATIAL DATA STRUCTURES* 3.1. Digitalization of information's 3.2. Vector structure concept 3.3. Raster structure concept 3.4. Advantages and disadvantages of vector structures 3.5. Advantages and disadvantages of raster structures *CHAP 4: THE GEOGRAPHICAL INFORMATION IN A GIS* 4.1. Concept of geographic information 4.2. Classification of geographical data 4.3. The digital map 4.4. Elements of a map 4.5. Types of maps *CHAP 5: INTRODUCTION TO GEOGRAPHIC COORDINATES SYSTEM* 5.1. Information and GIS 5.2. Representation of the earth - History 5.3. Geographic coordinate systems 5.4. Representation of the earth; sphere and spheroid 5.5. Geoid concept 5.6. Concept of datum

Content	*CHAP 6: MAIN CARTOGRAPHIC PROJECTIONS* 6.1. Need for flat coordinate systems 6.2. Projection concept 6.3. Projected coordinate systems 6.4. Types of projections - distortions 6.5. Types of projections - depending on the area used 6.6. Some important projections *CHAP 7: TYPES OF MAPS* 7.1. Conventional maps 7.2. Classification of thematic map *CHAP 8: FUNDAMENTALS OF REMOTE SENSING* 8.1. Remote Sensing Concept 8.2. Elements of a Space Remote Sensing system 8.3. Brief historical review 8.4. Advantages and disadvantages of Space Remote Sensing 8.5. Stages for the development of a Remote Sensing application
Study and examination requirements and forms of examination	*Continuous Evaluation* *A midterm exam.* *A final exam.*
Final grade Calculation	*Continuous Evaluation and Midterm Exam 40%* *Final Exam 60%*
Media employed	*Data show* *Computers* *Internet*
Reading list	Principles of Geographic Information SystemsOtto Huisman, Rolf A. de By (eds.) (ITC Educational Textbook Series; 1). Fundamentals of GIS (March 2018) ,ISBN: 978-9942-30-817-7
Reading list	Précis de télédétection Volume 3 traitements numériques d'images de télédétection , Régis Caloz et Claude Collet(2001). *https://www.esri.com/en-us/what-is-gis* *http://www.ign.fr/* *https://www.usgs.gov/*