Course Catalog 2023/24

Title of Program: Bachelor of Physics

Program Code	6-L-PHYS
Level	Undergraduate
Credits and	180 ECTS credits taken over 6 semesters
Duration	
Delivery Language	English

Academic Calendar

July 2023

М	τ.,	W	TI.	Ē.e	6.	<u> </u>
0	ιu	е		Fr	За	<i>5</i> u
					1	2
3	4	5	6	7	8	9
1	1	1	1	1	1	1
0	1	2	3	4	5	6
1	1	1	2	2	2	2
7	8	9	0	1	2	3
2	2	2	2	2	2	3
4	5	6	7	8	9	0
3						
1						

August 2023 Μ Th Fr Sa Su е 9 0 2 2 2 3 4 5 6 7 2 2 3 3

September 2023

M	Ти	W	Th	Fr	Sa	Su
0		U		1	2	3
1	~	/	7	0	0	1
4	5	6	/	8	9	0
1	1	1	1	1	1	1
1	2	3	4	5	6	7
1	1	2	2	2	2	2
8	9	0	1	2	3	4
2	2	2	2	2	3	
5	6	7	8	9	0	

October	2023
---------	------

M o	Ти	W e	Th	Fr	Sa	Su
						1
2	3	4	5	6	7	8
0	1	1	1	1	1	1
9	0	1	2	3	4	5
1	1	1	1	2	2	2
6	7	8	9	0	1	2

November 2023										
М 0	Ти	W e	Th	Fr	Sa	Su				
		1	2	3	4	5				
_	7	0	0	1	1	1				
6	/	8	9	0	1	2				
1	1	1	1	1	1	1				
3	4	5	6	7	8	9				
2	2	2	2	2	2	2				
0	1	2	3	4	5	6				

December 2023

М 0	Ти	W e	Th	Fr	Sa	Su
				1	2	3
Л	5	6	7	0	a	1
T	5	9	/	0	7	0
1	1	1	1	1	1	1
1	2	3	4	5	6	7
1	1	2	2	2	2	2
8	9	0	1	2	3	4

2	2	2	2	2	2	2
3	4	5	6	7	8	9
3	3					
0	1					

2	2	2	3	
7	8	9	0	

2	2	2	2	2	3	3
5	6	7	8	9	0	1

January 2024

М	Tu	W	Th	Erc	Sa	Sıı
0	ТИ	е		17	34	24
1	2	3	4	5	6	7
0	0	1	1	1	1	1
0	9	0	1	2	3	4
1	1	1	1	1	2	2
5	6	7	8	9	0	1
2	2	2	2	2	2	2
2	3	4	5	6	7	8
2	3	3				
9	0	1				

February 2024

М 0	Ти	W e	Th	Fr	Sa	Su
			1	2	3	4
_	/	7	0	0	1	1
5	0	/	8	9	0	1
1	1	1	1	1	1	1
2	3	4	5	6	7	8
1	2	2	2	2	2	2
9	0	1	2	3	4	5
2	2	2	2			
6	7	8	9			

March 2024

M o	Ти	W e	Th	Fr	Sa	Su
				1	2	3
1	5	6	7	0	a	1
T	5	9	/	0	9	0
1	1	1	1	1	1	1
1	2	3	4	5	6	7
1	1	2	2	2	2	2
8	9	0	1	2	3	4
2	2	2	2	2	3	3
5	6	7	8	9	0	1

April 2024

-						
М 0	Ти	W e	Th	Fr	Sa	Su
1	2	3	4	5	6	7
0	0	1	1	1	1	1
8	9	0	1	2	3	4
1	1	1	1	1	2	2
5	6	7	8	9	0	1
2	2	2	2	2	2	2
2	3	4	5	6	7	8
2	3					
9	0					

May 2024

М 0	Ти	W e	Th	Fr	Sa	Su
		1	2	3	4	5
_	-7	0	0	1	1	1
6	/	8	9	0	1	2
1	1	1	1	1	1	1
3	4	5	6	7	8	9
2	2	2	2	2	2	2
0	1	2	3	4	5	6
2	2	2	3	3		
7	8	9	0	1		

June 2024

М 0	Ти	W e	Th	Fr	Sa	Su
					1	2
3	4	5	6	7	8	9
1	1	1	1	1	1	1
0	1	2	3	4	5	6
1	1	1	2	2	2	2
7	8	9	0	1	2	3
2	2	2	2	2	2	3
4	5	6	7	8	9	0

Program Overview

The Bachelor of Physics is a three-year undergraduate programme taught in English. It follows the curriculum offered at Sorbonne Université (SU) in Paris. The diploma, awarded by SU and accredited in the UAE, is recognized world-wide.

Thanks to its sound background in physics and mathematics, the Bachelor of Physics programme educates students to be critical thinkers, problem solvers and innovators. They are well prepared to enter the work force or to pursue studies in postgraduate programmes: in Engineering Science, or in the different domains of Physics, as well as double major programmes. This bachelor programme opens the door to a wide variety of career prospects.

Teaching methodology involves lectures and tutorials, laboratory sessions, projects, written technical reports and oral presentations. Language (French or another language for French natives), Epistemology, Mechanics for Engineers and career planning courses are also part of the programme.

Outgoing collaborations of the Science and Engineering Department with the UAE Space Agency, the FANR, NYUAD, Khalifa University, Cleveland Clinic Abu Dhabi, Dubai Health Authority, and other companies and institutions foster the student's exposure to real-world expectations and interests.

Note on languages courses:

- Students who do not speak French take French classes. They are assigned to a group corresponding to their level, under the supervision of the FLE department (French as a Foreign Language department).
- Students who are fluent in French choose another language, among Italian, Chinese, Spanish, Arabic and English. These courses are offered by the LEA department (Foreign languages department) and the students are also placed in a group corresponding to their level.

Learning Outcomes

PLO 1	Model, analyse and solve simple physics problems involving fundamental physics subjects.	
PLO 2	Apply the scientific method, estimate orders of magnitude and critically analyse the result.	
PLO 3	Develop innovative skills through projects and problem solving and use multiple resources to solve problems, including programming and computing.	
PLO 4	Communicate the solution to a problem or the results of a scientific investigation using effective oral, written and presentation skills.	
PLO 5	Design an experiment and accurately record, analyze, interpret and critically evaluate the results	
PLO 6	Work collaboratively as well as in an independent and self- directed way, in different environments.	

Program Structure

Licence 1 Semester 1				
UE	Course Name	Credits	Date	
LU1MA001	Mathematics 1	9	Sep- Dec-2023	
LU1MEPY1	Mechanics-Physics 1	6	Sep- Dec-2023	
LU1SXOIP	Introduction into the World of Work 1	3	Sep- Dec-2023	
LU1PYAD2	Computer Science	6	Sep- Dec-2023	
LU1IN001	Geometric Optics	3	Sep- Dec-2023	
	UAE Studies	0	Sep- Dec-2023	
LU1PYAD1	Languages Abu Dhabi	3	Sep- Dec-2023	

Licence 1 Sem	lester 2		
UE	Course Name	Credits	Date
LU1MA002	Mathematics 2	6	Jan- May 2024
LU1MEPY2	Mechanics-Physics 2	9	Jan- May 2024
LU1SXARE	Active Science	3	Jan- May 2024
LU1PYAD3	1-Elektro-kinetics	3	Jan- May 2024
	2-Discipline 2	6	
	UAE Studies	0	Jan- May 2024
LU1PYAD4	Languages	3	Jan- May 2024

Licence 2 Sem	nester 3		
UE	Course Name	Credits	Date
LU2PY103	Thermodynamics	6	Sep- Dec-2023
LU2PY124	Special Relativity	3	Sep- Dec-2023
LU2PY110	Mathematics for Physics 1	6	Sep- Dec-2023
LU2PY220	Mathematics for Physics 2	6	Sep- Dec-2023
LUPY212	Experimental Physics 1	6	Sep- Dec-2023
	Languages	3	Sep- Dec-2023

Licence 2 Sem	nester 4		
UE	Course Name	Credits	Date
LU2PY121	Waves	6	Jan- May 2024
LU2PY121	Electromagnetism	6	Jan- May 2024
LU2PY104	Advanced mechanics	6	Jan- May 2024
LU2PY123	Mathematics for Physics 3	3	Jan- May 2024
LU2PY222	Numerical Physics	6	Jan- May 2024
LU2PY215	Experimental Physics 2	3	Jan- May 2024
	Languages	3	Jan- May 2024

Licence 3 Sem	ester 5		
UE	Course Name	Credits	Date
LU3PY101	Quantum Physics 1	6	Sep- Dec-2023
LU3PY121	Optics and Electromagnetism	9	Sep- Dec-2023
LU3PY215	Experimental Physics 3	3	Sep- Dec-2023
LU2PY213	Mathematics Methods S5	3	Sep- Dec-2023
LU3PY214	Introduction to Microelectronics &	3	Sep- Dec-2023
	Applications		
LU3PYOIP	Introduction to the world of work 2	3	Sep- Dec-2023
	Languages	3	Sep- Dec-2023

Licence 3 Semes	ster 6		
UE	Course Name	Credits	Date
LU3PY111	Quantum Physics 2	6	Jan- May 2024
LU3PY303	Thermo-statistics	6	Jan- May 2024
LU3PY122	Experimental and numerical Physics	6	Jan- May 2024
LU3PY236	Astrophysics	3	Jan- May 2024
	Spectroscopy	3	Jan- May 2024
	Internship	3	May- July 2024
	Languages	3	Jan- May 2024

Course Details – L1

Course Title &	Mathematics 1 – MATH100
Code	
Instructor	Dr Omar El Dakkak – Dr Grace Younes
Date	September – December 2023
Course Format	weekly class
Credits	9
Level	Undergraduate
Semester offered	1
Contact Hours	90Total Time Commitment: 90
Course	This course constitutes a thorough and rigorous introduction to
Description	univariate and multivariate differential calculus. Students are first
	introduced to Euclidean spaces and their main algebraic and
	topological properties. After this introduction, a rigorous treatment of
	the limit operation is presented, both for real functions of one variable

	and of several variables. Follows a thorough treatment of continuity
	and differentiability, once more for real functions of one and of more
	than one variable. Elements of optimization are then introduced. The
	course ends with an introduction to primitivizing and to the basic
	theory of differential equations. More specifically, separable variables
	differential equations, first-order linear differential equations as well
	as second-order differential equations with constant coefficients will
	be analysed in detail.
Evaluation	50% CC - 50%CF

Course Title &	Mechanics Physics 1 – PHYS 125
Code	
Instructor	Dr. Eliane Bsaibess
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	64 Total Time Commitment: 64
Course	This course covers the concepts and theories related to mechanical and
Description	thermodynamic equilibrium of macroscopic systems at rest or under a
	uniform linear motion. The course will include the study of four main
	topics.
	1. Dimensions in mechanics and physics, where we will cover the
	2 Equilibrium of mochanical systems, where we will introduce
	2. Equilibrium of mechanical systems, where we will introduce
	the concepts and methods to study the equilibrium of a
	foreas, and the rotational and translational equilibrium
	2 Undreastation where we will present the equilibrium.
	5. Hydrostatics, where we will present the equations utilized for studying the equilibrium in fluids (cases on liquids) and
	immersed solids
	Thermodynamics, where we will introduce the quantities used
	4. Incliniouyliantics, where we will infloduce the quantities used
	the concente of temperature and heat
Erralmation	100%/CC
Evaluation	1007000

Course Title &	Introduction into the World of Work 1– PHYS105
Code	
Instructor	Part Time Maria El Hassrouni –Part Time Anita Roberts
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	1
Contact Hours	30 Total Time Commitment: 30
Course	In this course, students will explore their own self, career aspirations,

Description	and the world around them. They will be armed to harmoniously face a
	professional world that is in continuous evolution. They will reflect on
	their career. The course explores two aspects. The first aspect focuses
	on the individual, through self-assessment and learning skills such as
	writing a CV and presenting oneself. The second aspect focuses on
	global trends and their current and future impact on the individual,
	society and economy. More precisely, students learn how the world of
	work is changing. As a result, they are made aware of the nature of
	competencies that will be relevant in the future and how their newly
	acquired skillsets can be employed to foster a successful career. The
	specific case of mathematicians and physicists will be tackled along the
	course.
Evaluation	100%CC

O T '(1 0	
Course little &	Geometric Optics – PHYS 118
Code	
Instructor	Dr.Valérie Le Guyon
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	1
Contact Hours	30 Total Time Commitment: 30
Course	This course covers the main concepts of geometric optics: refraction,
Description	reflection, tracing and calculation of light rays, ray diagrams, image
	formation, single-lens and multi-lens optical systems.
	At the end of the course, the student must be able to design simple
	systems combining ideal components (thin lenses in optics), but also to
	model them and evaluate their performance in terms of magnification,
	depth of field or resolution.
	On the experimental side, the students will apply and evaluate different
	ways to measure a lens' focal length and will design and set up an
	experiment for one specific optical system.
Evaluation	100%CC

Course Title &	Computer Science - CPSC-100
Code	
Instructor	Dr. Eliane Bsaibess – Dr.Lama Tarsissi
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course	The Computer science course is divided into two parts.
Description	
	Part 1: Introduction to the programming language Python (multi-

	platform language).
	Master the skills to navigate online notebooks and work with the Spyder interface using Anaconda navigator.
	Explore and grasp the basic notions of data structure like lists and arrays.
	Familiarize with practical modulus and their built-in functions.
	Develop logical reasoning abilities through for and while loops, and apply constructive algorithms to solve problems in mathematics, statistics, and image processing.
	Part 2: Introduction to the typesetting scientific text editor LaTex.
	Explore and grasp the basic notions of representing a good report
	Acquire the skills to represent a presentation using Beamer.
	The course concludes with a comprehensive understanding of both Python and LaTex in relation to scientific text editing.
1. Evaluation	100%CC

Course Title &	UAE Studies – GEED 101
Code	
Instructor	Dr kosmas Pavlopoulos -Dr Kévin Taillandier
Date	September – December 2023
Course Format	weekly class
Credits	0
Level	Undergraduate
Semester offered	1
Contact Hours	30 Total Time Commitment: 30
Course	The course "UAE studies" covers three major themes in general
Description	education about the UAE: physical geography, human geography, and
	history.
	• Physical Geography courses aim to understand how the Earth's
	physical environment of the UAE underlies and is affected by human
	activity over time. A holistic analysis of Earth systems and
	environmental change is attempted. This involves a representation of
	all environments in the UAE, including terrestrial, coastal, and marine,
	with case studies of the UAE's natural environment. The course will
	explore issues and challenges related to water resources and the energy
	transition in the context of sustainable development.
	• Human Geography courses examine a range of topics related to
	economic, urban, social, and cultural geography. Students will mobilise
	key geographical skills and materials to describe and critically analyse
	the impacts of globalisation on the UAE. Through oral presentations
	and face-to-face interviews, they will strengthen both their

	communication skills and their knowledge of where they live.
	• History courses intend to explore the rich history of the UAE,
	beginning with the early history of the aera and the people, the cultural
	developments, and the drastic transformations of the territory between
	the 16th century and the 21st century.
Evaluation	100%CC

Course Title &	Mathematics 2 – MATH 114
Code	
Instructor	Dr. Grace Younes
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	This course covers matrix theory and linear algebra, emphasizing topics
Description	useful in other disciplines. Linear algebra is a branch of mathematics
	that studies systems of linear equations and the properties of matrices.
	The concepts of linear algebra are extremely useful in physics, artificial
	intelligence, and engineering. Due to its broad range of applications,
	linear algebra is one of the most widely taught subjects in college-level
	mathematics. Topics include systems of linear equations, matrices,
	matrix algebra, determinants and inverses, linear combinations, linear
	independence, and Rn subspaces. We also consider linear
	transformations, isomorphisms, matrix representation of linear maps,
	eigenvalues and eigenvectors, diagonalization, similarity and inner
	product spaces.
Evaluation	100%CC

Course Title &	Mechanics-Physics 2 - PHYS-126
Code	
Instructor	Dr Stavros Christopoulos – Dr Eliane Bsaibess
Date	Jan- May 2024
Course Format	weekly class
Credits	9
Level	Undergraduate
Semester offered	2
Contact Hours	90 Total Time Commitment: 90
Course	This course studies the motion kinematics and dynamics of point
Description	particles and its mathematical description using Cartesian, polar,
	cylindrical and spherical coordinates. It also includes a discussion on
	the work-energy description of motion and the different types of
	potential energy, namely, elastic, gravitational and electrostatic. The
	course covers simple harmonic oscillation, the dynamics of fluids using
	Bernoulli's theorem and Poiseuille's Law and provides a description of
	the angular momentum of point particles and the rotation of solids.

	Finally, it includes an introduction to the dynamics in a non-Galilean
	trame of reference.
Evaluation	100%CC

C T'41 0	
Course little &	Active Science - PHYS-140
Code	
Instructor	Dr Delphine Syvilay
Date	Jan- May 2024
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	30 Total Time Commitment: 30
Course	This course covers the basic concepts, methodologies, and practical
Description	skills necessary to carry out basic investigation on a scientific topic.
	The students will be guided through the following fundamental steps:
	(i) choose a scientific topic of interest; (ii) identification of relevant
	scientific sources; (iii) evaluation of the state-of-the-art knowledge on
	that topic; (iv) pose related questions and suggest methodologies to
	address them; and (v) communicate their findings.
Evaluation	100%CC

Course Title &	Electro-kinetics – PHYS116
Code	
Instructor	Dr Joumana El Rifai
Date	Jan- May 2024
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	30 Total Time Commitment: 30
Course	This course introduces the students to a foundation of DC circuit
Description	analysis methods such as Kirchhoff's current and voltage laws, Ohm's
	law and network theorems. The capacitor and inductor will be
	examined along with their transient behaviour. The lecture content
	concludes with an introduction to the basics of semiconductors, the PN
	junction and diode static and dynamic characteristics. Applications of
	optical resistors and LEDs will be studied and the students will use the
	knowledge acquired during the lectures in related experiments and to
	assemble and submit a final project.
Evaluation	100%CC

Course Title &	Discipline 2 Chemistry – PHYS117
Code	
Instructor	Dr Eliane Bsaibess
Date	Jan- May 2024

Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	Build on the knowledge acquired by students in high school physics
Description	and chemistry courses.
	Deepen students' understanding to tackle new notions on chemical structure and reactivity. Cover the concepts and theories related to the structure - electronic and spatial - of atoms and molecules - neutral and charged.
	Study the structure to provide tools for modeling and predicting certain physico-chemical properties and reactivities.
Evaluation	100%CC

Course Title &	UAE Studies – GEED 101
Code	
Instructor	Dr. Kosmas Pavlopoulos - Dr Kévin Taillandier
Date	Jan- May 2024
Course Format	weekly class
Credits	0
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	The course "UAE studies" covers three major themes in general
Description	education about the UAE: physical geography, human geography, and
	history.
	• Physical Geography courses aim to understand how the Earth's
	physical environment of the UAE underlies and is affected by human
	activity over time. A holistic analysis of Earth systems and
	environmental change is attempted. This involves a representation of
	all environments in the UAE, including terrestrial, coastal, and marine,
	with case studies of the UAE's natural environment. The course will
	explore issues and challenges related to water resources and the energy
	Unistition in the context of sustainable development.
	• Human Geography courses examine a range of topics related to
	mabilize law geographical skills and materials to describe and
	aritically analyze the impacts of globalization on the UAE. Through
	and presentations and face to face interviews, they will strengthen
	both their communication shills and their knowledge of where they
	both their communication skins and their knowledge of where they
	• Fistory courses intend to explore the rich history of the UAE,
	beginning with the early history of the aera and the people, the cultural
	developments, and the drastic transformations of the territory between

	the 16th century and the 21st century.
Evaluation	100%CC

Course Details – L2

Course Title &	Thermodynamics – PHYS 208
Code	
Instructor	Dr Ahmed Slimani
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course	The course presents in depth the concepts of thermodynamic of systems
Description	at equilibrium and develops formalism to describe the transformations
	of a system between two equilibrium states. These notions will be
	applied to study the phase transitions. The course will introduce as well
	the basic concepts of statistical physics in order to show the link
	between the microscopic and macroscopic descriptions of a system.
Evaluation	100%CC

Course Title &	Special Relativity – PHYS 209
Code	
Instructor	Dr Stavros Christopoulos
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	1
Contact Hours	30 Total Time Commitment: 30
Course	This course studies changes in Galilean frames of reference, the
Description	principle of relativity, the Michelson-Morley experiment, and
	Einstein's postulates of special relativity and Lorentz transformations.
	It includes discussions on the consequences of the relativity of time,
	simultaneity and transformations of lengths and durations. We analyse
	the speed transformations and relativistic kinematics, optical
	aberrations, the Doppler-Fizeau effect and its applications. The course
	further covers the concepts of relativistic energies and momentum,
	mass-energy equivalence, mass defects, stability of nuclei and nuclear
	reactions. We study the conservation laws and relativistic collisions,
	the Compton effect, pair creation, relativistic dynamics, while ending
	with the principle of equivalence and an introduction to general
	relativity.
1. Evaluation	100% CC

Course Title &	Mathematics for Physics 1 – PHYS-210
Code	
Instructor	Dr Gianluca Mola
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course	This course covers the concepts and theories related to higher
Description	dimensional calculus. In particular, the operations of limit, derivatives
	and integrals will be in introduced. Concerning the latter, we shall
	focus on: integrals on multiple variables domains, line and surface
	integrals and the basic integro-differential identities (Gauss-Green
	formulae, Divergence and Stokes theorems).
Evaluation	100% CC

Course Title &	Mathematics for Physics 2 – PHYS-211
Code	
Instructor	Dr Samuel Feng
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course Description	 This course provides an introduction to fundamental concepts in the fields of probability, statistics and information theory. Four main topics are covered: Probability, where we introduce the concept of probability, random variables, and probability laws. Descriptive Statistics, where students are provided with a toolbox of fundamental descriptors and techniques to explore datasets. Statistical Inference, where students are exposed to both the frequentist and Bayesian framework, covering important concepts such as confidence intervals, hypothesis testing and the basics of Bayesian updating. Information Theory, where Shannon Entropy as the cornerstone of information theory is introduced, covering under this perspective the notions of joint entropy, conditional entropy and mutual information. A brief discussion of compression and channel capacity is provided as applications of the framework.
Evaluation	100%CC

Course Title &	Experimental Physics 1 - PHYS-212
Code	
Instructor	Ahmad Slimani
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course	The course provides students with experience working in a laboratory
Description	and teaches good work habits and techniques for approaching
	laboratory work. The course covers a wide range of topics as
	Analog/Digital Electronics and Programming. The course covers a
	number of prototyping techniques in electronics using an Arduino
	development board. This experimental know-how is put into practice
	during lab sessions and during a mini project at the end of the semester.
Evaluation	60%CF – 40% lab report

Course Title &	Electromagnetism - PHYS-213
Code	
Instructor	Dr Ahmed Slimani
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	This course introduces the concepts of electromagnetism, from
Description	electrostatics to Maxwell's equations and the electromagnetic wave. It
	teaches how to apply the laws of electromagnetism, how to determine
	the electric and magnetic fields for different charge distributions, and
	how to deduce a charge distribution from the electric and magnetic
	field it produces.
Evaluation	80%CC-20% Laboratory

Course Title &	Waves PHYS-203
Code	
Instructor	Dr. Valerie Le Guyon
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	This course covers fundamental concepts and theories related to
Description	mechanical and electromagnetic waves. The main topics included in
	this course are: (1) Wave propagation – providing the mathematical

	description of a wave and its characterization. (2) Wave propagation
	mechanisms – covering the description of longitudinal and transverse
	waves. (3) Electromagnetic waves – discussing the concept of plane
	waves and polarization. (4) Standing waves - describing the phenomena
	of standing waves and normal modes. (5) Interference and diffraction -
	discussing the interference patterns observed from two monochromatic
	sources, and a qualitative presentation of diffraction.
Evaluation	100%CC

Course Title &	Advanced Mechanics - PHYS-214
Code	
Instructor	Dr Joumana El Rifai – Dr Delphine Syvilay
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	Built on a progression in the degree of abstraction, this course of
Description	classical mechanics bridges the "physical mechanics" the first year
	courses with the more advanced courses of quantum mechanics and
	analytical mechanics offered in the third year of the program It will
	cover the following topics: two-body problem, conservative central
	forces, Kepler problem, collisions, forced oscillator, introduction to the
	analytical mechanics, and simple systems with n degrees of freedom.
Evaluation	55%CC-45%CF

Course Title &	Mathematics for Physics 3 - PHYS-218
Code	
Instructor	Dr Gianluca Mola
Date	Jan- May 2024
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	30 Total Time Commitment: 30
Course	This course covers the concepts and theories related to Cauchy
Description	problems for ordinary differential equations and systems of linear
	ordinary differential equations (dynamical systems) and their
	asymptotic behavior for large times. The course includes a discussion
	of the diagonalization of real matrices in arbitrary dimension, elements
	of triangularization and some considerations on spaces of Hermitian
	matrices.
Evaluation	100 %CC

Code	
Instructor	Dr Lama Tarsissi
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	The modelling of physical phenomena often involves the resolution of
Description	complex systems of equations that require the use of numerical analysis
	methods. In addition, the acquisition, manipulation and interpretation of
	data from experiments or physical observations also often require the
	use of computer tools. In this course students will develop the
	programming and modelling skills needed to solve a variety of physics
	problems. Applications will be based on models and concepts
	introduced in other physics courses (optics, electro-kinetics, mechanics,
	thermodynamics). This course is designed as an active and hybrid
	course. It gives equal importance to personal and face-to-face work.
	The activities include a variety of course materials, corrected exercises,
	self-assessment quizzes, problem solving and a team project.
Evaluation	100%CC

Course Title &	Experimental Physics 2- PHYS-217
Code	
Instructor	Dr Ahmed Slimani
Date	Jan- May 2024
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	Contact Hours: 30 Total Time Commitment: 30
Course	This course covers the basic concepts, methodologies, and practical
Description	skills necessary to analyse, contextualize and interpret datasets acquired
	from experimental designs or/and numerical simulations. Particularly,
	this course includes the discussion of the following topics: (1) Basic
	statistics and probability laws to characterize data sets. (2) Assessment
	and propagation of uncertainties for derived physical quantities. (3)
	Model fitting and parameter estimation. (4) Introduction to Monte-
	Carlo methods.
Evaluation	50%CC – 50% Laboratory

Course Details – L3

Course Title &	Quantum Physics 1 PHYS-303
Code	
Instructor	Dr Joumana El Rifai

Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course	The course is divided into three thematic blocks allowing for a
Description	progressive learning of quantum physics, starting from known notions
	of wave physics and mechanics, to gradually move towards the notions
	of wave functions and Schrödinger's equation. Subsequently we will
	present the postulates of Quantum Physics and introduce the Dirac
	notation. A final part will focus on two-level systems and their
	application to quantum information.
Evaluation	55%CC – 30% CF- 15% Laboratory

Course Title &	Optics and Electromagnetism - PHYS-305
Code	
Instructor	Dr Stavros Christopoulos
Date	September – December 2023
Course Format	weekly class
Credits	9
Level	Undergraduate
Semester offered	1
Contact Hours	90 Total Time Commitment: 90
Course	This course studies the propagation of electromagnetic waves in
Description	homogeneous and isotropic linear media (LHI) as well as in some
	specific cases of anisotropic media. It includes discussions on radiation,
	diffusion and scattering, the application of Maxwell's Equations and
	boundary conditions. The course further covers electric field in a
	dielectric material, index of refraction and dispersion, and Fresnel
	coefficients. We finally study polarization of light, interference and
	diffraction.
Evaluation	70%CC – 30% Laboratory

Course Title &	Experimental Physics 3 - PHYS-302
Code	
Instructor	Dr Delphine Syvilay
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	1
Contact Hours	30 Total Time Commitment: 30
Course	The purpose of this course is to use and understand diverse techniques
Description	and instruments commonly used in laboratories. The students will learn
	about the physical processes of different devices, especially
	spectroscopies. They will also be taught how to handle samples, and

	how to collect and analyse data. Finally, they will learn to find relevant
	scientific papers in the field of study, will develop a critical point of
	view, and report on their results, in written or with posters.
Evaluation	80%CC – 20% Laboratory

Course Title &	Mathematics Methods S5 – PHYS 316
Code	
Instructor	Dr Gianluca Mola
Date	September – December 2023
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	1
Contact Hours	60 Total Time Commitment: 60
Course	This course covers the concepts and theories related to holomorphic
Description	functions of one complex variable and Fourier transform. Both of the
	subjects will be introduced according to their basic mathematical
	properties, and most relevant theorems therein related. Also,
	applications to physics will be highlighted.
Evaluation	100%CC

Course Title &	Introduction to Microelectronics & Applications – PHYS 320
Code	
Instructor	Dr Joumana El Rifai
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester	1
offered	
Contact Hours	30 Total Time Commitment: 30
Course Description	This course builds on the foundations of circuit analysis and electronic devices covered in PHYS116 and PHYS213. It starts with an introduction to microelectronics and moves on to study two main semiconductor devices and discuss their applications: diodes and bipolar junction transistors (BJTs). Topics covered include: diode applications in rectifiers, power supply filters, limiter and clamper circuits. The final portion of the course starts by introducing the structure, biasing and characteristics of BJTs. This is followed by covering the different transistor biasing methods, AC equivalent circuits and the applications of BJTs as electronic switches and amplifiers. Part of the course is dedicated to lab work and students will use the knowledge acquired during the lectures in related experiments and to assemble and submit a final project.
Evaluation	30%CC – 30%CF- 40% Laboratory

Course T	ïtle	&	Introduction into the World of Work 2 – PHYS-315
----------	------	---	--

Code	
Instructor	Part Time Maria El Hassrouni – Part Time Anita Roberts
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	1
Contact Hours	30 Total Time Commitment: 30
Course	In this course, students will explore their own self, career aspirations,
Description	and the world around them. They will be armed to harmoniously face a
	professional world that is in continuous evolution. They will reflect on
	their career. The course explores two aspects. The first aspect focuses
	on the individual, through self-assessment and learning skills such as
	writing a CV and presenting oneself. The second aspect focuses on
	global trends and their current and future impact on the individual,
	society and economy. More precisely, students learn how the world of
	work is changing. As a result, they are made aware of the nature of
	competencies that will be relevant in the future and how their newly
	acquired skillsets can be employed to foster a successful career. The
	specific case of physicists will be tackled along the course.
Evaluation	100%CC

Course Title &	Quantum Physics 2- PHYS-307
Code	
Instructor	Dr Joumana El Rifai
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	This course is a continuation of the quantum mechanics teaching unit of
Description	the first semester. The objective is to deepen and develop knowledge of
	mechanics quantum. The tools introduced will be used to address
	important physical problems, such as the quantum treatment of the
	hydrogen atom. Special emphasis is paid towards studying the general
	properties of angular momentum in quantum mechanics and the
	stationary perturbation theory.
Evaluation	60%CC - 40%CF

Course Title &	Thermo-statistics - PHYS-301	
Code		
Instructor	Dr Stavros Christopoulos	
Date	Jan- May 2024	
Course Format	weekly class	
Credits	6	

Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	This course covers the concepts and theories related to
Description	thermodynamics, equilibrium systems and statistical physics. In the
	first two parts, the course discusses concepts of Thermodynamics
	(Fundamentals) and on many-body systems in equilibrium. There is an
	extensive analysis on the formalism to describe the transformations of a
	system between two equilibrium states. These concepts are applied to
	the case study of phase transitions and to an introduction to the physics
	of diluted solutions. The third part of this course introduces the
	concepts of statistical physics in order to show the link between
	microscopic and macroscopic description of a system.
Evaluation	100%CC

Course Title &	Experimental and Numerical Physics – PHYS - 313
Code	
Instructor	Dr Delphine Syvilay
Date	Jan- May 2024
Course Format	weekly class
Credits	6
Level	Undergraduate
Semester offered	2
Contact Hours	60 Total Time Commitment: 60
Course	This course aims to process spectra acquired from laboratory's
Description	instruments. Computer science will be applied for spectra processing:
	along the semester, students will develop their own software on
	MatLab to process spectra from a specific spectroscopy, from creating
	the interface to developing the statistical approach for quantitative
	analyses or sorting analyses.
Evaluation	100%CC

Course Title &	Astrophysics – PHYS 317
Code	
Instructor	Dr Stavros Christopoulos
Date	Jan- May 2024
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	30 Total Time Commitment: 30
Course	This course describes the main constituents of our Solar system,
Description	including terrestrial and Jovian planets and their features (atmosphere,
	interior, surface, satellites and rings), as well as the properties of our
	Sun (atmosphere, interior, chromosphere and corona). It also includes
	an introductory description of techniques used to detect exoplanets and
	concludes with a detailed account of stellar evolution and final state.

Evaluation 100%CC

Course Title &	Spectroscopy – PHY 318
Code	
Instructor	Dr Delphine Syvilay
Date	Jan- May 2024
Course Format	weekly class
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	30 Total Time Commitment: 30
Course	This course is an introduction to different analytical techniques based
Description	on spectroscopy. Physical processes involved for each spectroscopy
	will be detailed, as well as examples of applications for material
	characterizations. It is an overview of such complementary techniques
	to get a knowledge of the different possibilities to analyse materials.
Evaluation	100%CC

Course Title &	Internship – PHYS 310
Instructor	ΝΔ
Date	May – July 2024
Course Format	5 to 6 weeks – full time internship
Credits	3
Level	Undergraduate
Semester offered	2
Contact Hours	30 Total Time Commitment: NA
Course	The internship is a mandatory unit, scheduled in the last semester of
Description	the Bachelor of Physics (Semester 6). After the first Final
	Examination session, the intern will join the institution or company
	full time, for 5 to 6 weeks. The student will be exposed to a work
	environment and must work in an independent way on a scientific
	topic.
	At the end of the internship, the student writes a report and defends
	his/her work during an oral presentation. Both parts of this work are
	used to evaluate the internship, as well as the mentor's qualitative
	assessment.
Evaluation	100%CC

Course Title &	Languages – SCEN 101
Code	
Instructor	Bassem Mehouachi
Date	September – December 2023
Course Format	weekly class
Credits	3
Level	Undergraduate

Contact Hours 6	60 Total Time Commitment: 60
Course	This course covers the concepts and theories related to French
Description I	Language skills, it includes reading, writing, speaking and listening
	learnings as well as grammar and engaging student in simple
	discussions on day to day topics.
	This course introduces the fundamental elements of the French language within a cultural context. Emphasis is on the development of basic listening, repeating, pronunciation, dictation, speaking, reading, and writing skills. Upon completion, students should be able to comprehend and respond with grammatical accuracy to spoken and written French as well as demonstrate cultural awareness.
	The method used is from the book Atelier A1: textbook and workbook. The level of knowledge the students should reach further to this course's sessions is half way towards A1 Level on the CEFR (French CECR) scale. There are 2 units, each unit will take around 10 to 12 hours to work through. At the end of each unit there are exercises to test the progress of students. These skills are reinforced by videos, songs, sketches, dialogues in situation. We use materials such as the Digital Back to facilitate the acquisition of these skills
Evaluation	100%CC

Permanent Academic and Administrative Staff

Head of Department: Dr. Valerie Le Guyon

Permanent Faculty: Dr Ahmad Slimani Dr. Delphine Syvilay Dr. Eliane Bsaibess Dr. Gianluca Mola Dr Grace Younes Dr Joumana El Rifai Dr Stavros Christopoulos Dr Valerie Le Guyon

Academic Coordinator: Patricia Chahwane

Useful Contacts

Head of Department Dr Valerie Le Guyon .. Ext. 9283 valerie.leguyon@sorbonne.ae

Academic coordinator Mrs Patricia Chahwane Ext. 9417 Patricia.chahwane@sorbonne.ae

Student affairs

Head of Department Mr Eisa Alraeesi Ext. 9350 eisa.alraeesi@sorbonne.ae

Sports Head of Department Mr Alexandre Blaise Ext. 9356 Head of Department <u>alexandre.blaise@sorbonne.ae</u> Sports office sports@sorbonne.ae +971 (0) 2 656 9356

Other services Female student residence Ext. 9395 Male student residence Ext. 9394 Medical clinic Ext. 9629