BACHELOR IN MATHEMATICS

Concentration: Data Science

Main Language of Instruction:
French ○   English ⦿   Arabic ○

Campuses Where The Program Is Offered: CST, CLN, CLS, CZB

OBJECTIVES

This program aims to provide a comprehensive education in data science, a field at the intersection of mathematics and computer science. It covers programming and data analysis for managing and engineering big data, as well as mathematical tools such as probability and statistics for data interpretation. The program also includes courses in artificial intelligence and machine learning to extract insights from data and support decision-making.

PROGRAM LEARNING OUTCOMES (COMPETENCIES)

- Apply various mathematical techniques for processing problems related to massive quantities of data.
- Write computer programs in languages suitable for data science to collect, clean, and analyze data.
- Communicate the results of data analysis in oral, written, and visual form to both technical and non-technical audiences.
- Advocate for ethical decisions in the use of data.

PROGRAM REQUIREMENTS

180 credits: Required courses (144 credits), Institution's elective courses (12 credits), Open elective courses (6 credits), USJ General Education Program (34 credits - may be part of the above categories).

Fundamental Courses (154 Cr.)
Required Courses (142 Cr.)
Advanced Programming with C++ (6 Cr.), Applied Linear Algebra (6 Cr.), Artificial Intelligence (6 Cr.), Calculus I (6 Cr.), Calculus II (6 Cr.), Calculus III (6 Cr.), Computer Programming I (6 Cr.), Computer Programming II (6 Cr.), Data Mining (6 Cr.), Data Protection (2 Cr.), Data Structures and Algorithms (4 Cr.), Data Visualization (4 Cr.), Descriptive Statistics (4 Cr.), Discrete Mathematics (4 Cr.), Ethics for Data Science (2 Cr.), Foundations of Data Science (4 Cr.), Introduction to Big Data (4 Cr.), Introduction to Natural Language Processing (6 Cr.), Introduction to Programming with C++ (4 Cr.), Lab for R (4 Cr.), Matrix Computations (6 Cr.), Probability for Data Science (6 Cr.), Project Management (4 Cr.), Projects in Data Science (6 Cr.), Relational Databases (6 Cr.), Statistical Analysis of Data (6 Cr.), Statistics for Data Science (6 Cr.), Web Application (6 Cr.).

Institution's Elective Courses (12 Cr.), to be chosen from the list below:
Business and Professional Communication (4 Cr.), Classical Mechanics (4 Cr.), Excel and VBA (2 Cr.), Financial Mathematics I (2 Cr.), Financial Mathematics II (2 Cr.), Internet Programming (4 Cr.), Introduction to Economy (4 Cr.), Numerical Analysis (4 Cr.), Numerical Computation Software: MATLAB (2 Cr.), Series (4 Cr.).

Open Electives Courses (6 Cr.)

USJ General Education Program (34 Cr.)

Code	Course Name	Credits
	ENGLISH OR OTHER LANGUAGE	**4**
048ANGLL5	English Level A	4
	ARABIC	**4**
	Arabic Language and Culture	2

Code	Course Name	Credits
435LALML2 **or** 435LALAL2	Arabic Language and the Media **or** Arabic Language and the Arts	2
	Other Courses Taught in Arabic	**2**
048GESAL4 **or** 048EVMOL1 **or** 048TCSOL2	Basic Pre-Rescue First Aid **or** Self-Expression Through Music **or** Theater and Self-Discovery	2
	HUMANITIES	**10**
064VALEL1	USJ Values in Daily Life	2
	Ethics	**2**
048ETHDL2	Ethics for Data Science	2
	Civic Engagement and Citizenship	**2**
048CITBL1	Active Citizenship: Strategy and Techniques	2
	Other Humanities Courses	**4**
048OCSCL1 048JSCPL1 048MAMPL1 048SSDCL1 048DVQCL1	**Two courses out of the following:** Origin of Scientific Concepts Scientific Journalism The World, Current Events, and Me Sustainable Development Law in Everyday Life	2
	SOCIAL SCIENCES	**6**
	Professional Integration and/or Entrepreneurship	**2**
048ENTML6 **or** 048SJHPL2 **or** 048WRNBL2	Entrepreneurship **or** Successful Job Hunting **or** Work Ready Now	2
	Other Social Sciences Courses	**4**
048DBMML6 048SOLBL2 048EMIPL2 048TMMML2	**Two courses out of the following:** Designing Business Models Social Leadership Sociology of Emotions Time and Money Management	2
	COMMUNICATION TECHNIQUES	**4**
048BPCDL3	Business and Professional Communication	4
	QUANTITATIVE TECHNIQUES	**6**
048PRODL3	Probability for Data Science	6

USJ General Education Program (CLN) (34 Cr.)

Code	Course Name	Credits
	ENGLISH OR OTHER LANGUAGE	**4**
048ANGLL5	English Level A	4
	ARABIC	**4**

	Arabic Language and Culture	**2**
435LALML2 **or** 435LALAL2	Arabic Language and the Media **or** Arabic Language and the Arts	2
	Other Courses Taught in Arabic	**2**
043STREL1 **or** 043HTLBL2	Society, Ethics, and Religion **or** Lebanese Theatre History	2
	HUMANITIES	**10**
064VALEL1	USJ Values in Daily Life	2
	Ethics	**2**
048ETHDL2	Ethics for Data Science	2
	Civic Engagement and Citizenship	**2**
358CIACL4 **or** 016IEEDL2 **or** 090MOC2F2	Citizenship and Community Engagement **or** Community Educational Intervention **or** Mediation: A Friendly Approach to Conflict Management and Resolution	2
	Other Humanities Courses	**4**
016PENSL2 **or** 358DOUTL2 **or** 016ININL1	**Two courses out of the following:** Critical Thinking: A Tool for Personal Development **or** Doubt and Truth: A Critical Reading of Facts **or** Introduction to Disabilities	2
	SOCIAL SCIENCES	**6**
	Professional Integration and/or Entrepreneurship	**2**
358WORKL3	Work Ready Now	2
	Other Social Sciences Courses	**4**
358LEECL1	Panorama of the Lebanese Economy -1-	2
358PLE2L2	Panorama of the Lebanese Economy -2-	2
	COMMUNICATION TECHNIQUES	**4**
048BPCDL3	Business and Professional Communication	4
	QUANTITATIVE TECHNIQUES	**6**
048PRODL3	Probability for Data Science	6

USJ General Education Program (CZB) (34 Cr.) Students are required to take 34 credits. However, they may exceed this total depending on the courses chosen from the following sections: Other Humanities Courses, Other Social Sciences Courses

Code	Course Name	Credits
	ENGLISH OR OTHER LANGUAGE	**4**
048ANGLL5	English Level A	4
	ARABIC	**4**
	Arabic Language and Culture	*2*
435LALML2	Arabic Language and the Media	2
	Other Courses Taught in Arabic	*2*
062SOINL2 or 017FDZBF2	Basic Pre-Rescue First Aid or Training in Islamic-Christian Dialogue	2
	HUMANITIES	**10**
064VALEL1	USJ Values in Daily Life	2
	Ethics	*2*
048ETHDL2	Ethics for Data Science	2
	Civic Engagement and Citizenship	*4*
062AIBUI3	Artificial Intelligence in Business – The Ethics	4
	Other Humanities Courses	*2*
017FDZBF2 or 015ABC2L3 or 017CVIOF2	Training in Islamic-Christian Dialogue or Active Citizenship or Non-Violent Communication	4 2 4
	SOCIAL SCIENCES	**6**
	Professional Integration and/or Entrepreneurship	*4*
048ECONDL5	Introduction to Economy	4
	Other Social Sciences Courses	*2*
008ETINL5 or 358WORKL 062CCP4L3	Entrepreneurship and Innovation or Work Ready Now Career Coaching and Personal Branding	2 2
	COMMUNICATION TECHNIQUES	**4**
048BPCDL3	Business and Professional Communication	4
	QUANTITATIVE TECHNIQUES	**6**
048PRODL3	Probability for Data Science	6

USJ General Education Program (CLS) (34 Cr.) Students are required to take 34 credits. However, they may exceed this total depending on the courses chosen from the following sections: Other Courses Taught in Arabic

Code	Course Name	Credits
	ENGLISH OR OTHER LANGUAGE	**4**
048ANGLL5	English Level A	4
	ARABIC	**4**
	Arabic Language and Culture	*2*
435LALML2	Arabic Language and the Media	2
	Other Courses Taught in Arabic	*2*
017DICCF1 or 017CVIOF2 or 015ABC2L3	Training in Islamic-Christian Dialogue or Non-Violent Communication or Active Citizenship	4 3 2
	HUMANITIES	**10**
064VALEL1	USJ Values in Daily Life	2
	Ethics	*2*
048ETHDL2	Ethics for Data Science	2
	Civic Engagement and Citizenship and other Humanities Courses	*6*
015ABC2L3 or 008CETHL4 or 017SAFDF2 or 017CVIOF2 or 061FNEWL2	Active Citizenship or Corporate Culture and Ethics or Training in Islamic-Christian Dialogue or Non-Violent Communication or Fake News	2 2 4 4 2
	SOCIAL SCIENCES	**16**
	Professional Integration and/or Entrepreneurship	*2*
048ENTML6	Entrepreneurship	2
	Other Social Sciences Course	*4*
061WRNSL3	Work Ready Now	4
	COMMUNICATION TECHNIQUES	**4**
048BPCDL3	Business and Professional Communication	4
	QUANTITATIVE TECHNIQUES	**6**
048PRODL3	Probability for Data Science	6

SUGGESTED STUDY PLAN

Semester 1

Code	Course Name	Credits
048CA1DL1	Calculus I	6
048CP1DL1	Computer Programming I	6
048DSTDL1	Descriptive Statistics	4
048DIMDL1	Discrete Mathematics	4
048FDSDL1	Foundations of Data Science	4
	Specific to CST	
435LALML2 435LALAL2 048GESAL4 048EVMOL1 048TCSOL2	**One course out of the following:** Arabic Language and the Media Arabic Language and the Arts Basic Pre-Rescue First Aid Self-Expression Through Music Theater and Self-Discovery	2
048CITBL1 048OCSCL1 048JSCPL1 048MAMPL1 048SSDCL1 048DVQCL1	**Two courses out of the following:** Active Citizenship: Strategy and Techniques Origin of Scientific Concepts Scientific Journalism The World, Current Events, and Me Sustainable Development Law in Everyday Life	4
	Specific to CLN	
435LALML2 435LALAL2 043HTLBL2 043STREL1	**One course out of the following:** Arabic Language and the Media Arabic Language and the Arts Lebanese Theatre History Society, Ethics, and Religion	2
016CULTL1 043CULPL1 043STREL1 016ININL1 358WORKL3 358CIACL4 090MOC2F2	**Two courses out of the following:** General Knowledge Political Culture Society, Ethics and Religion Introduction to Disabilities Work Ready Now Citizenship and Community Engagement Mediation: A Friendly Approach to Conflict Management and Resolution	4
	Specific to CLS	
064VALEL1	USJ Values in Daily Life	2
435LALML2 015ABC2L3	**One course out of the following:** Arabic Language and the Media Active Citizenship	2
017CVIOF2 008CETHL4 061FNEWL2	**One course out of the following:** Non-Violent Communication Corporate Culture and Ethics Fake News	2
	Specific to CZB	
	Open Elective Course	2

Code	Course Name	Credits
017CVIOF2 062AIBUI3 017FDZBF2	**One course out of the following:** Non-Violent Communication Artificial Intelligence in Business - The Ethics Training in Islamic-Christian Dialogue	4
	Total	**30**

Semester 2

Code	Course Name	Credits
048LA1DL2	Applied Linear Algebra	6
048CA2DL2	Calculus II	6
048CP2DL2	Computer Programming II	6
048DAPDL2	Data Protection	2
048ETHDL2	Ethics for Data Science	2
	Institution's Elective Course	4
	Specific to CST	
048ENTML6 048SJHPL2 048WRNBL2 048DBMML6 048SOLBL2 048EMIPL2 048TMMML2	**Two courses out of the following:** Entrepreneurship Successful Job Hunting Work Ready Now Designing Business Models Social Leadership Sociology of Emotions Time and Money Management	4
	Specific to CLN	
016IEEDL2 016PENSL2 358DOUTL2 358LEECL1 358PLE2L2	**Two courses out of the following:** Community Educational Intervention Critical Thinking: A Tool for Personal Development Doubt and Truth: A Critical Reading of Facts Panorama of the Lebanese Economy -1- Panorama of the Lebanese Economy -2-	4
	Specific to CLS	
048ENTML6 061WRNSL3	**One or two courses out of the following:** Entrepreneurship Work Ready Now	4
	Specific to CZB	
062WONBL2 062CCP4L3	**One course out of the following:** Work Ready Now Career Coaching and Personal Branding	4
	Total	**30**

Semester 3

Code	Course Name	Credits
048CA3DL3	Calculus III	6
048PRCDL3	Introduction to Programming with C++	4
048PRODL3	Probability for Data Science	6
048RDADL3	Relational Databases	6
	Institution's Elective Course	4
	Specific to CST	
435LALML2 435LALAL2 048GESAL4 048EVMOL1 048TCSOL2	**One course out of the following:** Arabic Language and the Media Arabic Language and the Arts Basic Pre-Rescue First Aid Self-Expression Through Music Theater and Self-Discovery	2
048CITBL1 048OCSCL1 048JSCPL1 048MAMPL1 048SSDCL1 048DVQCL1	**One course out of the following:** Active Citizenship: Strategy and Techniques Origin of Scientific Concepts Scientific Journalism The World, Current Events, and Me Sustainable Development Law in Everyday Life	2
	Specific to CLN	
435LALML2 435LALAL2 043HTLBL2 043STREL1	**One course out of the following:** Arabic Language and the Media Arabic Language and the Arts Lebanese Theatre History Society, Ethics, and Religion	2
016CULTL1 043CULPL1 043STREL1 016ININL1 358WORKL3 358CIACL4 090MOC2F2	**One course out of the following:** General Knowledge Political Culture Society, Ethics and Religion Introduction to Disabilities Work Ready Now Citizenship and Community Engagement Mediation: A Friendly Approach to Conflict Management and Resolution	2
	Specific to CLS	
435LALML2 015ABC2L3	**One course out of the following:** Arabic Language and the Media Active Citizenship	2
017CVIOF2 008CETHL4 061FNEWL2	**One or two courses out of the following:** Non-Violent Communication Corporate Culture and Ethics Fake News	2
	Specific to CZB	
435LALML2 062SOINL2	**One course out of the following:** Arabic Language and the Media Basic Pre-Rescue First Aid	2
015ABC2L3	Citizenship and Community Engagement	2
	Total	**30**

Semester 4

Code	Course Name	Credits
048APCDL4	Advanced Programming with C++	6
048DSADL4	Data Structures and Algorithms	4
048RLADL4	Lab for R	4
048MCADL4	Matrix Computations	6
048STADL4	Statistics for Data Science	6
	Specific to CST	
435LALML2 435LALAL2 048GESAL4 048EVMOL1 048TCSOL2	**One course out of the following:** Arabic Language and the Media Arabic Language and the Arts Basic Pre-Rescue First Aid Self-Expression Through Music Theater and Self-Discovery	2
064VALEL1	USJ Values in Daily Life	2
	Specific to CLN	
435LALML2 435LALAL2 043HTLBL2 043STREL1	**One course out of the following:** Arabic Language and the Media Arabic Language and the Arts Lebanese Theatre History Society, Ethics, and Religion	2
064VALEL1	USJ Values in Daily Life	2
	Specific to CLS	
435LALML2 015ABC2L3	**One course out of the following:** Arabic Language and the Media Active Citizenship	2
017CVIOF2 008CETHL4 061FNEWL2 017SAFDF2	**One or two courses out of the following:** Non-Violent Communication Corporate Culture and Ethics Fake News Training in Islamic-Christian Dialogue	2
	Specific to CZB	
435LALML2 062SOINL2	**One course out of the following:** Arabic Language and the Media Basic Pre-Rescue First Aid	2
064VALEL1	USJ Values in Daily Life	2
	Total	**30**

Semester 5

Code	Course Name	Credits
048ARIDL4	Artificial Intelligence	6
048DMIDL5	Data Mining	6
048DVIDL5	Data Visualization	4
048ANGLL5	English Level A	4
048SADDL5	Statistical Analysis of Data	6
	Institution's Elective Course	4
	Total	**30**

Code	Course Name	Credits
048BDFDL6	Introduction to Big Data	4
048NLPDL6	Introduction to Natural Language Processing	6
048PRMDL6	Project Management	6
048PDSDL6	Projects in Data Science	6
048WEBDL6	Web Application	6
	Specific to CST	
048ENTML6 048SJHPL2 048WRNBL2 048DBMML6 048SOLBL2 048EMIPL2 048TMMML2	**One course out of the following:** Entrepreneurship Successful Job Hunting Work Ready Now Designing Business Models Social Leadership Sociology of Emotions Time and Money Management	2
	Specific to CLN	
016CULTL1 043CULPL1 043STREL1 016ININL1 358WORKL3 358CIACL4 090MOC2F2	**One course out of the following:** General Knowledge Political Culture Society, Ethics and Religion Introduction to Disabilities Work Ready Now Citizenship and Community Engagement Mediation: A Friendly Approach to Conflict Management and Resolution	2
	Specific to CLS	
048ENTML6 061WRNSL3	**One course out of the following:** Entrepreneurship Work Ready Now	2
	Specific to CZB	
008ETINL5	Entrepreneurship and Innovation	2
	Total	**30**

COURSE DESCRIPTION

048APCDL4	**Advanced Programming with C++**	6 Cr.

This course provides a comprehensive exploration of Object-Oriented Programming (OOP) principles within the context of the C++ programming language. Students will delve into the following key topics: Fundamental Principles of OOP; Classes and Objects in C++; Constructors and Destructors; Access Modifiers and Controlled Access; Inheritance and Polymorphism; Virtual Functions and Abstract Classes. By the end of this course, students will possess a strong foundation in OOP principles and practical skills in using C++ to design and implement efficient, modular, and maintainable software applications.

048LA1DL2	**Applied Linear Algebra**	6 Cr.

This course provides a modern elementary introduction to linear algebra and a broad selection of interesting applications. This modern approach reflects the ways data scientists and engineers use linear algebra in practice. The topics covered in this course are: Systems of linear equations, matrices, linear programming, determinants, vector spaces, inner product spaces, eigenvalues and eigenvectors, linear transformations, and numerical methods.

048ARIDL4 Artificial Intelligence 6 Cr.

This course introduces the fundamental concepts and techniques underlying the construction of intelligent computer systems. Topics covered in the course include: Intelligent agents, problem solving and searching algorithm, Game design, reasoning and decision making in the presence of uncertainty, machine learning, logic and knowledge representation, planning.

048BPCDL3 Business and Professional Communication 4 Cr.

This course offers students the knowledge of essential basic rules of main ways of communication (written, verbal and non-verbal). It provides tools and strategies to help them integrate into professional life, making them also aware of the errors to be avoided. This course is divided into two sections. Section one is designed to introduce students to the art and science of creating visually appealing presentations. In section two, students will acquire and enhance essential communication skills for academic and professional activities. The course provides theoretical knowledge and strategic communication techniques to effectively interact in various exchange situations, whether with individuals or mass audiences. Students will also learn to strategically use various communicative tools to create communication strategies that are adapted to the context and audience. The interactive course aims to develop students' skills as communicators and orators, enabling them to influence their peers and succeed in both their academic and professional endeavors.

048CA1DL1 Calculus I 6 Cr.

This course aims to give students proficiency in calculus computations, including computing limits, derivatives, and integrals. By the end of this course, students will be able to: Analyze functions using limits, derivatives, and integrals; Recognize the appropriate tools of calculus to solve applied problems; Use these analytical tools to solve application problems in a variety of settings ranging from physics and biology to business and economics.

048CA2DL2 Calculus II 6 Cr.

By the end of this course, students will be able to: Model and solve problems using sequences and series; Use an exhaustive range of discrete structures for data scientists; Use a programming MATLAB package designed for computations pertaining to sequences, series, & parametric and polar curves; Approximate a function around a point (Taylor & Maclaurin); Evaluate limits, continuity and differentiability of multivariable functions; Identify local and absolute extrema of a simple surface; Analyze and interpret parametric equations; Convert from Cartesian to polar coordinates; Analyze 3-D geometric figures.

048CA3DL3 Calculus III 6 Cr.

This course introduces students to advanced calculus concepts, focusing on partial derivatives, multiple integrals, line integrals, and second-order differential equations. Emphasis is placed on both theoretical understanding and practical applications in various fields.

048CITBL1 Active Citizenship: Strategy and Techniques 2 Cr.

This course provides students with a civic experience and exposes them to various forms of civic practices in Lebanon and around the world.

048MCLPL1 Classical Mechanics 4 Cr.

This course presents classical mechanics as a fundamental component of the science curriculum, developing expertise in solving problems related to point particles and rigid bodies. First-year students in Physics, Mathematics, and Chemistry will study Newtonian mechanics in depth, covering topics from point particle kinematics to accelerated reference frames.

048CP1DL1 Computer Programming I 6 Cr.

This course introduces students to the concepts of algorithms and programming using pseudocode and the Python language. By the end of this course, students will be able to: Design an algorithm to solve a specific problem; Translate pseudocode to computer programs using the Python language; Execute and debug a computer program using Python language.

048CP2DL2	Computer Programming II	6 Cr.

This course explains how to write simple to complex programs using the Python language.
By the end of this course, students will be able to: Write a Python program to solve a mathematical problem; Choose the appropriate data structure to store data; Analyze data using Python-specific libraries

048DMIDL5	Data Mining	6 Cr.

This course provides an in-depth exploration of key data mining concepts and techniques, equipping students with the skills to extract valuable insights from data. Students will learn about data preprocessing, association rules, classification methods, clustering, and support vector machines through both theoretical study and hands-on implementation.

048DAPDL2	Data Protection	2 Cr.

This course presents good practices of personal data protection for Data Science students.
By the end of this course, students will be able to: Understand the key terms used in the field of data protection; Comprehend their roles and responsibilities under the General Data Protection Regulation (GDPR) and the Data Protection Act (DPA) 1998; Identify data protection principles that all organizations must adhere to; Recognize the lawful grounds for processing personal data; Understand the importance of risk management and implement it using a specific framework; Learn the different techniques used to protect personal data.

048DSADL4	Data Structures and Algorithms	4 Cr.

This course introduces fundamental concepts of data structures and algorithms using the C++ programming language. Students will learn about pointers, recursion, algorithmic complexity, various sorting methods, linked lists, stacks, queues, and binary trees.

048DVIDL5	Data Visualization	4 Cr.

This course introduces students to the fundamental principles and techniques of data visualization. Through hands-on exercises and projects, students will learn how to create effective visualizations using various chart types and tools.

048DSTDL1	Descriptive Statistics	4 Cr.

This course explains how to use the statistical concepts essential for data science. The notions acquired are used in a practical way in their work when collecting, analyzing and interpreting data. By the end of this course, students will be able to: Calculate measures of central tendency and measures of dispersion and interpret their meaning; Organize data in frequency tables and represent them using many graphs; Use descriptive and deductive statistical methods to study the association between two numerical variables (linear regression) and to analyze their correlation.

048DIMDL1	Discrete Mathematics	4 Cr.

This course aims to: Introduce concepts of mathematical logic for analyzing propositions and proving theorems; Demonstrate the ability to write and evaluate a proof, outline the basic structure of each proof technique described, and give examples of them; Use sets for solving applied problems, and use the properties of set operations algebraically; Investigate functions as relations and their properties; State and use the Quotient-Remainder Theorem (Division Algorithm) and construct divisibility arguments; Apply the Euclidean Algorithm.

048DBMML6	Designing Business Models	2 Cr.

This course introduces Design Thinking, a framework for solving business problems and creating successful products. It covers the five iterative phases of the process:
  - Discovery: gathering information around stakeholders, user pain points, business requirements, etc.
  - Definition: re-framing the problem to be broad enough to encourage out-of-the-box thinking, while remaining focused enough to meet business needs.
  - Ideation: exploring different ways to address the problem and meeting the user's needs.

- Prototype: producing a low-fidelity version of the product/service/etc. that doesn't require imagination to visualize the solution.
- Testing: gathering feedback from target users on the prototype to understand what works and what needs to be modified.

048ANGLL5	English Level A	4 Cr.

This course is designed to develop critical thinking, reading, oral and writing skills. It focuses on synthesizing sources, producing a research paper, and defending it in front of an audience. Emphasis is on the analytical reading of different text types required in the disciplines as well as on synthesis from a variety of sources to produce a written text and present it orally.

048ENTML6	Entrepreneurship	2 Cr.

This course introduces the fundamentals of entrepreneurship in a rapidly evolving work environment, where traditional career paths are being reshaped by innovation and technology. It emphasizes the development of an entrepreneurial mindset and provides students with the education and support to explore alternative career paths beyond the traditional trajectory.

048ETHDL2	Ethics for Data Science	2 Cr.

This course delves into the ethical considerations and responsibilities that data scientists face in their work. Students will explore various ethical frameworks, analyze real-world case studies, and engage in discussions to develop a comprehensive understanding of ethical decision-making in the context of data science.

048EVBML2	Excel and VBA	2 Cr.

The VBA (Visual Basic for Applications) language allows users to customize beyond what is normally available with Microsoft Office host applications (Word, Excel, etc.). This course allows students to discover the VBA language, to program in VBA and to write macros. Students will be able to develop programs to perform automated and repetitive tasks on spreadsheets.

048FM1ML5	Financial Mathematics I	2 Cr.

This course aims to give a clear introduction to the financial world through learning the fundamental mathematics behind it. It introduces students to the concept of assets and liabilities in a firm and applies the financial theory to these components and to the market in order to help make knowledgeable decisions regarding funds, investments and insurance.
The plan is aligned with the Society of Actuaries FM exam. After taking this course, students will be equipped with the official content of the first part of this exam. In addition, the course is mostly based on real-world applications making it very useful for the various professional fields.
Financial mathematics is an essential tool for every person handling corporate figures, balance sheets, investments or funds. This course provides students with the necessary methodologies and approaches permitting the analysis of cashflows, investments, financial products in order to make decisions regarding capital allocations, insurance choices, banking plans, etc.
Throughout the course, students will begin by learning the basic terminology and key components of financial calculus then gradually learn how to apply these in financial problems and situations.

048FM2ML6	Financial Mathematics II	2 Cr.

This course continues from Financial Mathematics I and focuses on the applied aspects of financial mathematics in insurance, banking, and other companies. Aligned with the SOA FM exam, it emphasizes applying exam concepts to company figures and investment strategy analysis. Centered on real-case applications, mainly using Excel with real datasets, it provides practical skills for various job fields. The course covers interest rate implications, maturity and liquidity gaps, and asset-liability management through duration and weighting of financial instruments. It also addresses stock price simulations and relates discussions to real financial crises and portfolio gains and losses.

048FDSDL1   Foundations of Data Science   4 Cr.

This course introduces students to the data scientist toolkit and its core concepts.
By the end of this course, students will be able to: Understand data science terminologies; Experiment with data science tools for data analytics, big data etc.; Understand the concept of No-SQL database. To support the learning objective, the coursework includes exercises and resources in which students will face and solve real world problems.

048INPRDL2   Internet Programming   4 Cr.

This course is designed for beginners who want to learn the basics of web development with HTML and CSS. Students will learn how to create a basic web page layout, format text, add images, links, and lists using HTML tags, and apply styles and layouts using CSS. By the end of the course, students will have the foundational skills to create simple web pages.

048BDFDL6   Introduction to Big Data   4 Cr.

This course aims to explore the BIG DATA world by understanding all the technical components and aspects, through the study of the top frameworks and databases by learning and practicing in multiple scenarios and applications.

048ECONDL5   Introduction to Economy   4 Cr.

This course provides students with a foundation in microeconomic and macroeconomic principles, focusing on understanding the behavior of contemporary economies. The course employs economic models and graphical tools to illustrate how supply, demand, and macroeconomic aggregates influence economic outcomes.

048NLPDL6   Introduction to Natural Language Processing   6 Cr.

The course on Natural Language Processing (NLP) is designed to equip students with a comprehensive understanding and practical skills in working with human language data.

048PRCDL3   Introduction to Programming with C++   4 Cr.

This course introduces the basics of programming using the C++ language. Students will learn about variables, control structures, functions, and arrays, with a focus on practical application through hands-on coding exercises. By the end of the course, students will be able to: Write simple C++ programs, understand syntax, and debug code; Utilize variables, operators, and input/output operations; Apply conditional statements and loops to control program flow; Design and use functions, both predefined and user-defined; Manipulate arrays and work with multidimensional arrays; Understand basic string operations.

048JSCPL1   Scientific Journalism   2 Cr.

This course aims to teach students the basic techniques and rules of journalistic writing. By the end of this course, students will be able to understand the fundamental techniques of journalistic writing, assess the relevance of scientific information that could be published (information selection) in general media, and write both a news story and a scientific press article.

048JSCPL1   Scientific Journalism   2 Cr.

This course aims to teach students the basic techniques and rules of journalistic writing. By the end of this course, students will be able to understand the fundamental techniques of journalistic writing, assess the relevance of scientific information that could be published (information selection) in general media, and write both a news story and a scientific press article.

048RLADL4   Lab for R   4 Cr.

This course is designed to provide students with hands-on experience and proficiency in utilizing the R programming language for statistical analysis, data visualization, and data manipulation. Students will engage in practical exercises and real-world applications to develop a comprehensive understanding of R's capabilities.

| 048DVQCL1 | Law in Everyday Life | 2 Cr. |

This course aims to familiarize students with the basic concepts of law, providing a pedagogical introduction to an essential but seemingly daunting subject, especially for science students. The goal is to enable these students to understand current legal issues, know their basic rights and obligations as citizens, and understand their national legal system in relation to international law. Through examples, this course helps students locate and decipher legal texts, relevant references in legislation, or international conventions. Finally, through examples, this course emphasizes the correct use of words and legal terminology.

| 048MCADL4 | Matrix Computations | 6 Cr. |

This course provides a comprehensive understanding of numerical linear algebra, focusing on practical applications for computational scientists and engineers. Topics covered include fast transforms, parallel LU decomposition, discrete Poisson solvers, pseudospectra, structured linear equation problems, structured eigenvalue problems, large-scale singular value decomposition (SVD) methods, and polynomial eigenvalue problems.

| 048ANNML4 | Numerical Analysis | 4 Cr. |

This course familiarizes students with the concept of numerical analysis. They will learn how to approach the solution of non-linear systems and to interpolate data with polynomials. They will be able to use the least square method and to give an approximation of the derivative and the integral of functions. Finally, they will learn how to approximate the solutions of differential systems. They will also be able to estimate the error between the exact solution and the approximated one in all cases.

| 048LCNML3 | Numerical Computation Software: MATLAB | 2 Cr. |

This course introduces MATLAB, a numerical computation software that enables matrix manipulation, data and curve visualization, algorithm implementation, and user interface creation through its interactive programming language. It highlights MATLAB's applications across engineering, science, and economics in both industrial and research contexts.

| 048OCSCL1 | Origin of Scientific Concepts | 2 Cr. |

This course introduces the process of conducting reflexive analysis on the origins and development of scientific concepts as well as the history of scientific disciplines. It aims to develop their critical thinking skills in relation to the examination of the current connections among epistemology, philosophy of science, and science history. The various epistemological currents and ideas that have influenced the development of scientific knowledge are also covered. Understanding contemporary scientific ideas in the fields of mathematics, physics, chemistry, and life sciences requires these reflective components. Science education and the stance of the scientific researcher are influenced by the epistemological analysis of the development of scientific theories.

| 048PRODL3 | Probability for Data Science | 6 Cr. |

This course equips students with the techniques required to analyze and explain random phenomena. After studying enumerative combinatorics, which constitute a benchmark to probability calculations, the concept of independent events is discussed. Then, the study of random variables and the main probability laws (Bernoulli, binomial, Poisson, geometric, hypergeometric, uniform, Gaussian, exponential) are detailed. At the end, the weak law of large numbers and the central limit theorem are covered to enable students to pursue statistics courses.

| 048PRMDL6 | Project Management | 4 Cr. |

This course provides a comprehensive introduction to the principles and practices of project management. Students will learn the fundamental concepts, techniques, and tools required to initiate, plan, execute, monitor, and close projects successfully. Through case studies, group discussions, and practical exercises, students will develop the skills needed to manage projects across various industries.

| 048PDSDL6 | Projects in Data Science | 6 Cr. |

By the end of this course, students will be able to put into practice the knowledge they have acquired during his training. This involves applying statistics and quantitative analysis, programming in R and in scripting (Python) or

compiled (C++) languages to the processing of real data. At the end of the project, student will present a written report detailing the work they have done.

048RDADL3	Relational Databases	6 Cr.

This course provides a comprehensive introduction to the fundamental concepts and practical applications of relational database systems. Through a combination of theoretical understanding and hands-on exercises, students will gain the knowledge and skills necessary to design, create, query, and manage relational databases effectively. The course covers various aspects of database management, including data modeling, SQL query language, normalization techniques, database administration, and data quality assurance. Additionally, students will explore advanced topics such as object-oriented databases, data warehousing, and the integration of database technologies.

048ETSML4	Series	4 Cr.

By the end of this course, students will be able, on the one hand, to study the validity of the parameter-dependent integral of functions and calculate those integrals.
On the other hand, they will get acquainted with the notion of infinite sum of terms and will examine the convergence of the series and distinguish between different types of convergence of sequences and series of functions. They will also be capable of developing functions by means of power series, after having examined the necessary conditions.

048SADDL5	Statistical Analysis of Data	6 Cr.

This course offers a comprehensive introduction to statistical analysis techniques for data interpretation and decision-making. The course focuses on practical applications using the R statistical software. Students will gain the skills to analyze and interpret data, perform various statistical tests, and use advanced techniques for multivariate data analysis.

048STADL4	Statistics for Data Science	6 Cr.

This course provides Data Science students with an understanding of statistical concepts to include sampling, estimation using confidence intervals, hypothesis testing, regression, correlation analysis, Goodness-of-fit tests and independence Chi square tests.

048SOLBL2	Social Leadership	2 Cr.

This course explores social leadership, an emotional and empathetic leadership style that emphasizes connection, collaboration, and communication. It covers how leaders cultivate trust, care, and respect within teams to foster an open and positive work environment. Students will learn to leverage emotional intelligence and interpersonal skills to influence others, rather than relying solely on position or title, enhancing effectiveness in today's workplace where employees seek meaning and purpose in their work.
By the end of this course, students will be able to:
- Identify the values and principles of social leadership.
- Develop essential skills for becoming a social leader.
- Define their purpose and guide their team on this same track.
- Understand the 9 core principles of the NET Model.
- Identify areas of strength and areas that need improvement.

048EMIPL2	Sociology of Emotions	2 Cr.

This course familiarizes students with the sociological theories of emotions, explores the impact of emotions on individual and collective decisions, and analyzes social interactions through the prism of emotions.

048SJHPL2	Successful Job Hunting	2 Cr.

The course introduces students to professional life and its demands in terms of personal development and technical knowledge.

It covers:
1- Responding to a job offer (application e-mail, cover letter, CV)
2- Passing a job interview (dress code; body language; how to present yourself; dos and don'ts; etc.)
3- Searching for a job offer (profile on LinkedIn; search for an offer on LinkedIn, etc.; post your CV on Monster, Bayt and Co, etc.; searching for job offers on the websites of institutions, companies, hospitals, industries, etc.)

048SSDCL1	Sustainable Development	2 Cr.

This course introduces students to the interconnections between economic sectors and human activities, with a focus on sustainable development and the United Nations Sustainable Development Goals (SDGs). It also examines the role of public and private institutions in advancing these goals.

048MAMPL1	The World, Current Events, and Me	2 Cr.

This course encourages students to think about the major issues that dominate current events and impact the country and the world. Through an analysis of the news that affects them, widely discussed news, and the news that fuels public debate, students will learn to develop their critical thinking and express their viewpoints, particularly during this period of health, economic, social, and political crises that Lebanon is experiencing.

064VALEL1	USJ Values in Daily Life	2 Cr.

This course aims to raise students' awareness of the core values of the Saint Joseph University of Beirut (USJ) and encourage them to integrate these values into their personal, interpersonal, and professional lives. It engages them in a critical reflection on how the values outlined in the USJ Charter can influence their behaviors, actions, and decisions in addressing contemporary challenges. Students will also become aware of global issues and ethical responsibilities, preparing them to contribute positively to building a better society.

048WEBDL6	Web Application	6 Cr.

This course is designed as an integral component of the Data Science Bachelor's Degree program. The course aims to equip students with the knowledge and skills necessary to develop robust and interactive web applications tailored for data science purposes.

048WRNBL2	Work Ready Now	2 Cr.

The Work Ready Now program provides young students with the essential skills and knowledge needed to find and keep a job. This program, created by Higher Education Capacity Development (HECD), was designed in a participatory and practical manner so that students are actively involved in the learning process, gaining new skills and self-confidence to secure and maintain employment. Additionally, the learning methods allow students to develop digital skills through the use of free online software.

435LALML2	Arabic Language and the Media	2 Cr.

This course allows students to explore the Arabic language and its culture through diverse media forms, including journalism and advertising in visual, audio, and written formats. It develops practical linguistic, oral, and written skills.

435LALAL2	Arabic Language and the Arts	2 Cr.

This course allows students to explore the Arabic language and its culture through various art forms, including painting, calligraphy, and Arabic ornamentation. It develops practical linguistic, oral, and written skills.

048GESAL4	Basic Pre-Rescue First Aid	2 Cr.

This course focuses on recognizing emergencies, identifying appropriate first aid procedures, and providing initial care.

048EVMOL1	Self-Expression Through Music	2 Cr.

This course engages students in selecting songs in Arabic, French, English, and Italian to develop a group project that inspires self-expression through music or original text.

| 048TCSOL2 | Theater and Self-Discovery | 2 Cr. |

This course is aimed at students who wish to learn acting techniques in a recreational and enjoyable setting. Sessions focus on exercises in dramatic arts such as warm-up, body expression, relaxation, trust-building games, diction exercises, voice and breathing work, mime, improvisation, body and rhythm, physical movements, motor skills, space management, and stage presence. The course aims to help students master and enhance their presence on stage and their interaction with the audience for any type of performance: lectures, seminars, etc. Practice is conducted individually and collectively on stage, combining the enjoyment and discipline of performance. The teaching approach emphasizes the body and voice as the actor's primary tools and encourages creativity in responding to scenarios and delivering text in diverse ways.

CLN

| 016IEEDL2 | Community Educational Intervention | 2 Cr. |

This course engages students in community and civic action through an educational intervention.
Students will identify a real need within an organization, design and implement an action or project to address it, and evaluate the entire process in a written report.

| 358CIACL4 | Citizenship and Community Engagement | 2 Cr. |

This course is designed to enable the development of a sense of civic leadership in USJ students and provide them with the necessary skills to help them successfully accomplish their mission. Students will (1) Become familiar with the social and community context of their own environment. (2) Develop citizen leadership skills and the ability to act as a change agent. (3) Acquire tools for managing citizen engagement projects.

| 016PENSL2 | Critical Thinking: A Tool for Personal Development | 2 Cr. |

This course offers a pedagogical space for reflection that develops one of the essential 21st-century skills: critical thinking.
It is based on positive and constructive doubt, which nurtures the intellectual ability to reason properly, draw thoughtful conclusions, and support them with sound arguments. This approach fosters intellectual autonomy and the capacity to make decisions that enhance both personal and professional quality of life.
Through practical techniques of questioning, analysis, priority setting, identifying preconceived ideas, and making comparisons, several key areas are explored: self-awareness, project development, problem analysis, decision-making, time management, and stress management.
The ultimate goal of the proposed tools is to enable students to develop self-respect and appreciation of their own abilities in order to build a better self — one that finds its rightful place and values its engagement in both personal and professional dimensions.
This dynamic also equips students with simple techniques they can pass on to young learners to help them in their personal growth.

| 358DOUTL2 | Doubt and Truth: A Critical Reading of Facts | 2 Cr. |

This course guides students in developing critical thinking skills, enabling them to analyze and interpret the events and circumstances around them. It also trains them to examine speeches and films, opening their minds through philosophical and social reading frameworks.

| 016CULTL1 | General Knowledge | 2 Cr. |

This course encourages students to open themselves to new cultural horizons through an active and creative approach to gathering information. It provides a space for exchange, sharing, and the confrontation of ideas, fostering the development of intellectual curiosity and tolerance toward otherness. Beyond its cultural dimension, it promotes a reflective mindset, prompting each student to question their own representations, enrich their understanding of the world, and refine their critical thinking.

| 016ININL1 | Introduction to Disabilities | 2 Cr. |

This course, founded on an ethical stance, raises students' awareness of the issue of difference and the concept of disability, by developing their critical and reflective thinking. It aims to deepen understanding of this concept

in its historical, social, and educational evolution. Students will discover the main categories of impairments and disorders, in light of international classifications. The course also addresses the rights of persons with special educational needs, as well as the impact of disability on the family and those around them, with a view to promoting an inclusive approach that respects human diversity.

043HTLBL2	Lebanese Theatre History	2 Cr.

This course examines the evolution of Lebanese theatre, focusing on its modes of expression and the issues it addresses. It also explores the civic dimension of Lebanese theatre.

090MOC2F2	Mediation: A Friendly Approach to Conflict Management and Resolution	2 Cr.

By the end of this course, students will be able to (1) Identify the different types of conflicts. (2) Master the mediator's tools (3) Prevent and resolve conflict situations using mediation techniques.

358LEECL1	Panorama of the Lebanese Economy -1-	2 Cr.

This course provides an overview of fundamental economic concepts, in order to understand how the Lebanese economic crisis arose. It first introduces the political regime of "consociational democracy" to understand the roots of high levels of inequality in Lebanese society. Second, it presents the results and conclusions of the World Bank's recent work on Lebanon's economic situation. Third, it focuses on three macroeconomic variables: gross domestic product (GDP), inflation and unemployment, which are key measures of a country's economic performance.

358PLE2L2	Panorama of the Lebanese Economy -2-	2 Cr.

This course examines Lebanon's economic crisis and the conditional $3 billion IMF loan agreement of April 2022, designed to help the country address its worst economic crisis. It provides and explains several solutions as first steps toward economic reforms and recovery: tackling inequality through progressive taxation; negotiating assistance and reform packages between Lebanese authorities and the IMF; and considering full dollarization or a currency board regime to improve the quality of the national currency and ensure a definitive end to its depreciation.

043CULPL1	Political Culture	2 Cr.

This course covers the following topics: What is politics? What is the meaning of the term "politics"? What is the purpose of politics? What are the different political bodies? What are they for? How to define the various political regimes? What is the relationship between politics and religion?

043STREL1	Society, Ethics and religion	2 Cr.

This course offers a dynamic approach to reflection and research on the relationships between a society that is evolving and religion, which can either hinder or support this development, and how ethical questions can intervene and at what level. As a result, the course analyzes the relationships between the three monotheistic religions and society through themes that touch on the political and civil life of citizens, such as the issue of secularity and secularism, and related questions like that of civil marriage. Other questions are studied addressing the relationship between religion and the development of society: issues related to LGBTQ+, cohabitation, euthanasia, and other varied themes.

358WORKL3	Work Ready Now	2 Cr.

The Work Ready Now program provides young students with the fundamental skills and knowledge necessary to find and maintain employment. This program developed by 'Higher Education Capacity Development' (HECD) was designed in a participatory and practical manner so that students are actively involved in the learning process and acquire new skills and self-confidence to find and keep a job. Moreover, the learning modalities allow students to develop digital skills through the use of free online software. Moreover, the learning modalities allow students to develop digital skills through the use of free online software.

CLS

| 015ABC2L3 | Active Citizenship | 2 Cr. |

This course is part of the general education program at USJ. It aims to raise students' awareness of the importance of their involvement in civic life by providing them with the opportunity to engage in various volunteer activities. This course consists of two components: theoretical instruction and supervised practical work.

| 008CETHL4 | Corporate Culture and Ethics | 2 Cr. |

This course introduces students to topics related to ethics and culture. It aims to raise awareness of the importance of ethics, its concepts and main definitions, as well as the significance of culture in its various aspects and the impact of ethical culture on business development. Examples from international companies help illustrate the influence of ethics on individual behavior, institutional and state organizations, business development through technology and innovation, creativity and marketing, quality control processes, and management.

The general objectives are to raise students' awareness of the importance of culture and ethics; understand the connection between culture and ethics; explain the impact of ethics and culture on decision-making and business development and introduce students to issues related to corruption.

| 061FNEWL2 | Fake News | 2 Cr. |

This course helps students understand rumors and fake news and develop critical thinking skills to evaluate information circulating on the internet.

| 017CVIOF2 | Non-Violent Communication | 2 Cr. |

This course introduces Nonviolent Communication (NVC), a method developed by Marshall Rosenberg in the 1970s. It examines how thinking, self-expression, and communication influence conflict and interaction, either generating violence or facilitating understanding. The course focuses on four essential components: observation or description, feelings and emotions, identifying and expressing needs, and formulating achievable requests.

| 017SAFDF2 | Training in Islamic-Christian Dialogue | 4 Cr. |

This course provides students with foundational knowledge and practical skills in Islamic-Christian dialogue, fostering mutual understanding, interfaith communication, and peaceful coexistence through theological, cultural, and historical perspectives.

| 061WRNSL3 | Work Ready Now | 4 Cr. |

The Work Ready Now course provides students with the foundational "soft skills" and work-based learning experiences to prepare them for success in the workplace. Work Ready Now is designed to facilitate participatory, hands-on teaching and learning. Students will be actively engaged in the learning process and provided opportunities to practice and enhance new skills and gain the self-confidence necessary to secure and maintain work related to their professional goals. Work-based learning activities are woven into the course and require students to go to real workplaces in the community outside of class time. Students will be guided to use free online digital tools to demonstrate their learning. Throughout the course, students will create a career portfolio that will help them on their experiential Work Ready Now journey from student to employee.

CZB

| 015ABC2L3 | Active Citizenship | 2 Cr. |

This course is part of the general education program at USJ. It aims to raise students' awareness of the importance of their involvement in civic life by providing them with the opportunity to engage in various volunteer activities. This course consists of two components: theoretical instruction and supervised practical work.

| 062AIBUI3 | Artificial Intelligence in Business - The Ethics | 4 Cr. |

This course offers a comprehensive examination of the ethical dimensions and societal implications of deploying Artificial Intelligence (AI) and Machine Learning (ML) technologies within a business context. Designed for current and aspiring leaders, managers, and policymakers, the course moves beyond the technical aspects of AI to focus on the organizational and managerial responsibilities required for its ethical use.

| 062SOINL2 | Basic Pre-Rescue First Aid | 2 Cr. |

This course aims to introduce students to basic first aid to be administered in the event of an accident or sudden illness and to teach them how to respond effectively in emergency situations.

| 008ETINL5 | Entrepreneurship and Innovation | 2 Cr. |

This course introduces students to entrepreneurship and innovation as real career paths. It helps them explore the mindset and behavior of entrepreneurs, understand the full innovation process — from problem identification to creating sustainable solutions — and recognize the key challenges faced by entrepreneurs, including those in social entrepreneurship.

| 062CCP4L3 | Career Coaching and Personal Branding | 4 Cr. |

This dynamic and hands-on course is designed to empower individuals to take intentional control of their career trajectory and build a powerful, authentic professional brand that attracts opportunity. It combines the strategic, goal-setting principles of career coaching with the essential communication and marketing skills of personal branding.

| 017CVIOF2 | Non-Violent Communication | 2 Cr. |

This course introduces Nonviolent Communication (NVC), a method developed by Marshall Rosenberg in the 1970s. It examines how thinking, self-expression, and communication influence conflict and interaction, either generating violence or facilitating understanding. The course focuses on four essential components: observation or description, feelings and emotions, identifying and expressing needs, and formulating achievable requests.

| 017FDZBF2 | Training in Islamic-Christian Dialogue | 4 Cr. |

This course helps students prepare to engage in constructive communication with individuals from different religious backgrounds and to become familiar with the main general doctrines of Christianity and Islam.

| 048WRNBL2 | Work Ready Now | 2 Cr. |

The Work Ready Now program provides young students with the essential skills and knowledge needed to find and keep a job. This program, created by Higher Education Capacity Development (HECD), was designed in a participatory and practical manner so that students are actively involved in the learning process, gaining new skills and self-confidence to secure and maintain employment. Additionally, the learning methods allow students to develop digital skills through the use of free online software.