

# **INTERNATIONAL UNIVERSITY OF LEADERSHIP**

## **CATALOG ADDENDUM**

**S.Y. 2022 -2023**



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**Catalog Addendum 2022 - 2023**

The International University of Leadership Catalog Addendum for 2022-2023 is a description of the newly added undergraduate program: Bachelor of Science in Computer Science.

Additions to the curriculum are made through the IUL Advisory and Academic Committee process with an approval of the board.

For the 2022-2023 academic year, all approved additions are reflected in this addendum. Please use information contained here as the most accurate and up-to-date catalog information regarding the new courses and new program.

The undergraduate admission process and requirements are maintained without change for all IUL programs including the new BSCS.

There are no modifications to the faculty roster for the General Education Courses, additional Computer science Faculty joined our University, and their names and credentials are published in the last section of the Addendum.

IUL endeavors to present its programs and its policies accurately and fairly to the public.

## **New Program- Bachelor of Science in Computer Science**

### **❖ Program Description**

The Bachelor of Science in Computer science offers students a versatile training in Computer Science: algorithms and programming, design, development and administration of Databases, analysis and design of information systems, computer networks, software engineering, data engineering, Business Intelligence, Web development, Artificial Intelligence, Big Data and Security... without forgetting basic training in Computer Architecture and Operating Systems, Compilation Techniques. The students also benefit from courses in General Education and Communication.

This degree allows three specialization options: Big data technologies, Web and mobile technologies, and Cyber Security. It is aimed at analytical driven individuals who possess strong critical thinking abilities and wish to harness the power of Information technology to transform the world. It prepares the next generation of global pioneers who can collect, manage, and analyze data to solve the most pressing challenges of businesses and institutions.

### **❖ Program Outcomes**

Upon completion of the Computer Science program, students will have opportunities for professional development and strong foundational skills in programming languages, software development, complex algorithms, database systems, and data structures. Students will be able to develop algorithms and implement those algorithms in a high-level computer language. Students will also be able to evaluate algorithms for complexity and efficiency. Students will have developed critical thinking and mathematical modeling skills that are vital for solving complex processes.

The specific objectives of the BSCS in Big Data Analytics:

- Students will apply machine learning technologies to real- world problems through datathons, big data challenges and applied class projects.
- Students will develop all the skills needed to transform industries and businesses through the power of data analytics and statistics.
- Develop the business intelligence and analytical capacities needed to approach and solve complex problems.
- Develop the necessary skills to design technologies and strategies and become an influential part of the strategic decision-making processes of companies and organizations.



The specific objectives of the BSCS in Web and mobile technologies:

- Equip students with the skills to design, develop and maintain secure and usable web and mobile applications that exploit the capabilities of the internet, IoT sensors in the handheld devices and Artificial Intelligence.
- Develop student skills and teach them how to use emerging technologies in mobile and web development/programming.
- Learn how to write intelligent mobile/web applications and gain expertise in systems design and analysis. Using tools such as React, Graphical databases, NodeJS etc.
- Students will be able to write scripting languages for developing dynamic, interactive and secure web and responsive mobile solutions.

The specific objectives of the BSCS in Cyber Security:

- Students will learn the operational procedures and technologies to design, implement, administer, secure, and troubleshoot corporate networks while applying cybersecurity principles operationally.
- Prepare students with the technical knowledge and skills needed to protect and defend computer systems and networks.
- To develop graduates that can plan, implement, and monitor cyber security mechanisms to help ensure the protection of information technology assets.

### ❖ Curriculum

The BSCS is a 120 Cr program, where teaching is provided through Synchronous and Asynchronous lectures, practical zoom classes and supervisions.

In Years 1 and 2, assessment is currently by three-hour examinations taken in the final term of each year. In Year 3, students are assessed by coursework and three-hour examinations. Practical work is undertaken and assessed in all years of the degree program.

#### **Year 1**

Year 1 covers four topics within various courses including three compulsory Computer Science courses covering topics such as foundations of computer science, Java and object-oriented programming, operating systems, and digital electronics, graphics, interaction design and Mathematics

#### **Year 2 and Year 3**

Year 2 and 3 cover four more core topics within various courses including

- theory – including logic and proof, computation theory
- systems – including computer design, computer networking
- programming – including compiler construction, advanced algorithms
- applications and professionalism – including artificial intelligence, graphics, security

Student will undertake a group project which reflects current industrial practice.

**Year 4**

The fourth year is designed for any missing courses not completed as well as completion of the concentration courses, the suggestion is for two in each term as students will undertake a substantial research project due by end of year demonstrating their computer science skills. Projects are often connected with current research, and many utilize cutting-edge technology.

Successful completion of the full curriculum will qualify for the BSCS degree attainment at the end of the program.

**❖ Program Outline**

<b>GENERAL ED</b>	
COM 101	Communication 1
COM 102	Communication 2
COM 200	Communication 3
COM 300	Communication 4
ECO 100	Microeconomics
ENC 101	English Composition 1
ENC 102	English Composition 2
ENC 201	Research and Writing 1
ENC 202	Research and Writing 2
ENC 350	Writing Internship Reports
LDR 200	Leadership and Innovation
MAN 410	Organizational Behavior
MAT 100	College Mathematics
PSY 100	Psychology 1
STA 102	Statistics 1
<b>CORE COURSES</b>	
ADM 200	Advanced databases management
AI 300	Artificial Intelligence
ALG 100	Algorithms and programming
ALG 200	Advanced algorithms and data structures
BDA 300	Big data analytics
CC 300	Cloud Computing
CPC 200	Compiler and Complexity
CSA 100	Computer architecture

CSI 200	Cryptography and IS Security
CSN 100	Computer networks
FPJ 200	Frameworks programming: Java & Java JEE
IOT 300	Internet of Things
ISD 100	Information systems and databases
MAD 400	Mobile application development
OOP 200	Object Oriented Programming (C#)
OSP 100	Operating systems and systems programming
OOP 400	Object Oriented Programming (UML)
PSP 100	Python Programming (supervised project)
SDM 200	Software Development methodologies
SEN 200	Software engineering
WED 100	Web development
<b>Concentration 1: Big Data Technologies</b>	
BDD 400	Big Data and databases NoSQL
BI 400	Business Intelligence
DTM 400	Data Mining and Text Mining
ML 400	Machine learning
<b>Concentration 2: Web and Mobile App Technology</b>	
ADM 400	Advanced Mobile application development
AMS 400	Architecture micro-services
AWP 400	Advanced web programming
WAD 400	Web Architecture and Distributed Systems
<b>Concentration 3: Cyber Security</b>	
BC 400	Block chains
NS 400	Computer network security
ISA 400	Information systems auditing
DSV 400	Data center & Servers virtualization

### ❖ Course Description

#### *Numbering System*

100–300 Undergraduate General Education and Core Courses

301–499 Undergraduate upper level and Concentration Courses

PA: Courses with Proctored Assessment.

ADM 200      Advanced databases management

This course covers advanced aspects of Database Management Systems including their architectures and their evolution. The sessions are organized into two elements. The first element is mainly devoted to PL/SQL, the object model, the object-relational model and the evaluation and optimization of queries. The second element is dedicated to advanced administration of Oracle DBMS, internal architecture, storage techniques and query evaluation techniques. Other important aspects such as maintenance, logging, recovery, security and data privacy are also taught in this course.

ADM 400      Advanced Mobile application development

Prerequisite: ADM200

This course will teach students how to set up a hybrid development environment, to develop a mobile application based on Ionic and Angular, master the productivity tools offered by Node, integrate a Mobile Backend and will conclude by students preparing the build and deployment of an application.

AI 300          Artificial Intelligence

This course consists of two elements: Functional Programming (with LISP) and Logic Programming (with PROLOG). It provides students with the basic elements of functional programming (everything is a function, everything is a list, everything is an expression, etc.) and logic programming (predicate logic, fact base and rule base, unification, resolution, backtracking, etc.). The second element offers students the elements of Artificial Intelligence: intelligent system and intelligent agent, ontology, knowledge base and knowledge representation, problem solving, reasoning, expert system, case-based system, natural language processing and multi-agent system.

ALG 100      Algorithms and programming

This course introduces computational thinking and programming. It covers two elements' Algorithms and C programming. In the first element of this course, students will explore the fundamentals of algorithms, and look into their description and analysis using pseudocode, going through variables, control structures and arrays.

The second element of this course will introduce students to the world of C programming, how to make simple computations, how to store values in variables and use logical statements and arrays in C and implement some fundamental algorithms to search and sort data.



ALG 200      Advanced algorithms and data structures

*Prerequisite: ALG100*

An overview of data structure concepts, arrays, stack, queues, trees, and graphs. Discussion of various implementations of these data objects, programming styles, and run-time representations. The course will also examine algorithms for sorting, searching, graph algorithms & some greedy algorithms.

AMS 400      Architecture micro-services

*Prerequisite: ADM400*

In this course, architecture based on microservices will be studied, its use, its attributes and design. By developing and consuming REST services, setting up microservices using a Java framework and deploying microservices in Docker containers. Students will need to administer and monitor microservices at the end of this class.

AWP 400      Advanced web programming

*Prerequisite: WED100 and ADM400*

This course further applies student learning about web programming by developing a multi-page web application (SIA/SPA), developing the Front-End of an application with generic Frameworks: Angular/React, implement server-side JavaScript processing and add a data persistence layer via a NoSQL approach.

BC 400      Block chains

*Prerequisite: DSV400*

This course will allow students to know the concepts of blockchain technology, to differentiate between private, public, with/without crypto currency blockchains. Course will cover different consensus algorithms, write smart contracts in GO language, and integrate blockchain technology into the architecture of own IS.

BDA 300      Big data analytics

This course offers advanced lessons on the techniques of business analytics on big data as well as the techniques of visualization, analysis and interpretation of data. This course aims to introduce students to different concepts: web data analysis and data visualization through dashboards and KPIs. This course allows students to learn how data analysts describe, predict, and inform business decisions in the specific areas of marketing, human resources, and finance.

BDD 400      Big Data and databases NoSQL

*Prerequisite: BDA300*

This course is designed to understand why the era of Big Data was born. It will help the student become familiar with the terminology and fundamental concepts behind Big Data problems,

applications, and systems. It allows one to begin thinking about how Big Data could benefit one's business or career.

The course discusses Big databases and NoSql architectures by looking at different examples and introducing one of the most common frameworks that allowed for more accessible Big Data processing.

#### BI 400      Business Intelligence

The Business Intelligence and Analytics Course provides a fundamental understanding of data management and data analytics. Gain skills in applying correct statistical techniques for decision making and more importantly learning how to develop state-of-the-art predictive models and how to make decisions that optimize business objectives.

To become a specialist in Data analytics, the student has to explore new tools available in the market and hone the skills in the science of decision making.

This course will allow students to hone their skills in data discovery, predictive analytics, and data-driven decision-making.

#### CC 300      Cloud Computing

This course covers the basics of cloud computing: what it is, what it supports, and how it is delivered. Students will look at storage services, cloud economics, managed infrastructure tiers, compare some of the cloud computing platforms and architectures, discuss the future of cloud computing, cloud computing deployment models and hosting scenarios.

#### COM 101      Communication 1

#### COM 102 Communication 2 Prerequisite : COM 101

Communication 1 and 2 represent a General Education foundation. In these classes, you will learn important concepts and skill sets that translate across disciplines. Both COM 101 and COM 102 provide information that is relevant to students of all majors and disciplines. Their goal is to introduce students to the foundations of communication, a skill we all use regardless of our career.

#### COM 200      Communication 3

Students will learn to write a variety of documents characteristic of the business world including letters, memos, short reports, and formal reports. The course will focus on techniques for writing clearly, concisely, and persuasively. The course will also help students develop skills in presentations, Interviews, Speeches.

#### COM 300      Communication 4

Introduces students to the basic corporate communication, what it encodes and promotes, the external communications, media relations, external events, company profiling, and introduction to internal communication.

CPC 200      Compiler and Complexity

This course will cover a compiler for a programming language, teach students how to use compiler construction tools, such as generators of scanners and parsers and become familiar with compiler analysis and optimization techniques. This course will have students work on a software project.

CSA 100      Computer architecture

The computer architecture course introduces students to the design of computer systems and its components, work through different CPU design, ISA, and address as well as understand different memory management and I/O strategies and techniques.

CSI 200      Cryptography and IS Security

*Prerequisite: CSA100 and CSN100*

This course focuses on the fundamentals of information security that are used in protecting both the information present in computer storage as well as information traveling over computer networks. Interest in information security has been spurred by the pervasive use of computer-based applications such as information systems, databases, and the Internet.

CSN 100      Computer networks

*Prerequisite: CSA100*

The course aims at introducing four major concepts pertaining to computer networks: data communications, networking, protocols and standards, and networking models. The course will go through how computers networks work by understanding the data communication components and how different types of data can be represented, and how to create a data flow. Students will be exposed to different categories of computer networks, characteristics, and functionalities. They will also be exposed to the major Network models that serve to organize, unify, and control the hardware and software components of data communications and networking.

DSV 400      Data center & Servers virtualization

In this course, Server Virtualization is the main topic, its architecture, its actions - both in the datacenter and on desktop. Students will learn how companies are using tools to move applications running in physical hosts to virtual machines and will explore how to test and deploy server virtualization. This course will have a concentration project where students will build a server virtualization of their own.

DTM 400      Data Mining and Text Mining

*Prerequisite: ML400*

Data Mining studies algorithms and computational paradigms that allow computers to find patterns and regularities in databases, perform prediction and forecasting, and generally improve

their performance through interaction with data. Student will learn the various techniques for analyzing text to extract useful insights and patterns to support decision making. They will also learn about text classification, detection of topics in documents, and methods to group them into similar topics.

ECO 100      Microeconomics

Examines economic decision-making process, theory of consumer behavior, economics of the firm, and market structure. Discusses major issues of welfare economics, comparative systems, and other microeconomics topics.

ENC 101      English Composition 1

ENC102-PA   English Composition 2

*Prerequisite: ENC101*

Introduces practice and applies structure through the development of a wide range of topics dealing with literature, economics, health care, and life-style. Reading, exercises, writing are integral aspects of these courses.

ENC 201      Research and Writing 1

ENC 202      Research and Writing 2

*Prerequisite: ENC201*

These writing courses introduce students to discourse, research, and research writing for the purpose of proposing solutions to problems and have the opportunity to enter into important discussions and ultimately create a digital portfolio that enables them to publish and share their research and writing.

ENC 350      Writing Internship Reports

This special writing course introduce students to writing specific reports, including Internship and job-related reports.

FPJ 200      Frameworks programming: Java & Java JEE

This course focuses on the fundamentals of Java programming. Java is one of the most in-demand object-oriented programming languages and the foundation of the Android operating system. In this course, students will get to know the history of Java and learn the basics of java programming, they will learn to create conditional statements, functions, loops and arrays to process information and solve problem. This course is also intended to help students gain an in-depth understanding of the concepts of Multithreading, Java collections, Graphical interfaces and Networking.



IOT 300      Internet of Things

The Internet of Things is transforming our physical world into a complex and dynamic system of connected devices on an unprecedented scale. Clearly, IoT-enhanced systems have many advantages such as ubiquitous network connectivity, real-time response, better situational awareness, and process optimization. This course will provide an overview of the exciting and relevant technical areas essential for computer science students to scale up the concepts around the IoT and allow integration with the different skills acquired in their engineering curriculum.

ISA 400      Information systems auditing

This course will cover the general framework for IT risks and control. By Identifying the unique elements of computer environment and discussing how they affect the audit process, students will be able to describe the controls and audit issues related to computer operations, understand the audit objectives and procedures used to test data management controls as well as confer the stages in the Systems Development Life Cycle and describe the change management controls.

ISD 100      Information systems and databases

«Information Systems and Databases» course offers students an introduction to Database systems with a focus on the relational analysis and design. It also covers the MERISE Method and its various components and models.

In this course, students also learn basic SQL «Structured Query Language», which is shown as an industrial variant for practical database querying and transformation.

LDR 200      Leadership and Innovation

This course explores innovation theory and practice in relation to theories and processes of change. It includes the opportunity to explore leadership techniques relevant to change management, entrepreneurship and innovation.

MAD 400      Mobile application development

The course will cover the notions of mobile programming under Android and the constraints of using mobile resources, to present the specificities of mobile systems and the resulting software needs.

MAN 410      Organizational Behavior in Business

*Prerequisite: LDR200*

Presents the fundamental concepts of organizational behavior. Emphasizes the human problems and behaviors in organizations and methods of dealing with these problems. Focuses on motivation, informal groups, power and politics, communication, ethics, conflict resolution, employment laws, technology and people, and managing change.

MAN 450      Project Management

Presents the fundamentals of the project management process and examines application of the process. Reviews the stages and activities in the project life cycle, the organization for project management, and various project control and evaluations processes. Introduces considerations for negotiation and human resource management concerns in project management

MAT 100      College Mathematics

Emphasizes representations and operations of high degree polynomials and rational expressions, functions, and the graphing of linear functions. Methods of solving linear and quadratic equations are discussed. Graphs, rational, logarithmic, and exponential functions.

ML 400      Machine learning

This course covers advanced concepts of machine learning, where students will understand and apply ensemble learning (e.g., bagging, boosting, and stacking) as well as deep learning techniques.

NS 400      Computer network security

Security is vital in computing this course will teach about the core principles and concepts of a security network, ranging from appropriate password creation to complex network security principles. An advanced practical skill set in assuring network security against all threats including - advanced hackers, trackers, exploit kits, Wi-Fi attacks and more. Students will need to discover security vulnerabilities across an entire network and must be able to configure firewalls on all platforms including Windows, MacOS, and Linux for all types of attack scenarios.

OOP200      Object Oriented Programming (C#)

This course will introduce several programming paradigms including Object Oriented Programming, Generic Programming, Design Patterns. To show how to use these programming schemes with the C# programming language to build programs.

OOP 400      Object Oriented Programming (UML)

*Prerequisite: OOP200*

This course covers all the fundamentals of object-oriented design, analysis and programming with UML (Unified Modeling Language). You will learn how to analyze and design classes, and their relationships. You will also learn to use common UML diagrams such as use-case, class, activity & other diagrams. The diagrams will be created through a free tool.

OSP 100      Operating systems and systems programming

This course presents the basic elements that make up an operating system (processes, input/output, memory, files, etc.). The problems of management of these elements by the operating system are explained: how do the processes share access to the processor? How do

they synchronize and what mechanisms allow them to exchange data? How are memory and I/O managed?

The objective is to acquire technical skills related to the operation of an operating system (process scheduling, synchronization, communication...).

**PSP 100      Python Programming (supervised project)**

This course is an intermediate-level course in Python. Students are expected to be comfortable with Algorithmic. Topics covered will include lectures on the Python language and development environment as well as coverage of some select Python modules that demonstrate the versatility of the Python language.

**PSY 100      Psychology 1**

Introduces psychology as a human and scientific endeavor. Includes examination of concepts and methods in learning, motivation, development, personality, and social behavior.

**SDM 200      Software Development methodologies**

This course covers the fundamentals of software engineering, including understanding system requirements, finding appropriate engineering compromises, effective methods of design, coding, and testing, team software development, and the application of engineering tools.

**SEN 200      Software engineering**

This course will cover the use of engineering approach to computer software development process. It will present software engineering concepts and principles within the software development life cycle (SDLC). The course will also cover the 5 major steps for SDLC: Requirements gathering, requirements analysis, design, implementation and Testing.

Students work in teams on projects for real clients. This class will include a feasibility study, requirements analysis, object-oriented design, implementation, testing, and delivery to a potential client.

**STA 102      Statistics 1**

Concentrates on the art of describing and summarizing data. Includes the topics of experimental design, measures of central tendency, correlation and regression, and probability and chance variability. Demonstrates statistical applications to a wide variety of subjects, such as the social sciences, economics, and business.

**WAD 400      Web Architecture and Distributed Systems**

*Prerequisite: AWP400*

This course will cover the concepts of web technologies, familiarize students further with developed infrastructures and services of the Internet, as well as discover new client-side and server-side technologies. Students will learn about new architectures and their security.

WED 100      Web development

This course will cover the essentials of web development application and its architecture. It will provide a practical understanding of web page designing techniques, embedded dynamic scripting on both client and server-side web page development.

The course will also cover several technologies such as Hypertext Markup Language (HTML), Cascading Style Sheets (CSS) and JavaScript.



## **BSCS Core and Concentration Courses Faculty List**

*\*No changes the General Education Faculty*

Abnane Ibtissam, Area of Specialization : Operating systems and systems programming

PhD in Information Technology and engineering Sciences from ENSIAS

Master of Science in Information Systems, ENSA

Benelallam Imade, Area of Specialization: Algorithms and data structures/ Frameworks programming

PhD in IT, from University Mohamed VI.

Master in IT, from University Mohamed VI.

Bouamoud Bachir, Area of Specialization: Information systems auditing/ Computer network security

Phd in computer science specialized in the optimization of connectivity in the context of the Internet of Things, High National School for Computer Science and Systems Analysis

Engineering Degree of Telecommunication and electronic Systems et the Faculty of Sciences and technologies

El Bajta Manal Area of Specialization: Computer architecture

PhD in Information Technology from ENSIAS

Engineering Degree in Information Systems from ENSIAS

El Harchaoui Othmane, Area of Specialization : Artificial Intelligence

Engineering Degree in Information Technology from Institut Nationale des Postes et Telecommunication

El Handri Koutar, Area of Specialization : Big data analytics

Ph.D. Computer Science, Laboratory of Research in Computer Science (LRI-IPSS). Mohammed V University

Master of Computer Science Applied to the Development of Oshore (IADO), Faculty of Science

Makdoun Ibtissam, Area of Specialization : Advanced databases management/Computer networks

Software engineering Master of Science in Security of Information systems, Ecole Nationale des sciences Appliquees

Qarafi Jawahir, Area of Specialization : Data Mining and Text Mining

Engineer in Data Engineering, Ecole des sciences de l'information, MA

Sardi Lamyae, Area of Specialization : Python Programming/Web development

Master's degree – Computer Networks, Telecommunications and Multimedia. ENSIAS.

**[Http://iulf.education](http://iulf.education)**

**7380 W. Sand Lake Rd, Suite 500, Orlando  
Florida 32819**

**Ph: 407-801-5140**

**Email: [info@iulf.education](mailto:info@iulf.education)**

**Web: <http://iulf.education>**