

Information Systems - Engineering of Intelligent Systems

PACE UNIVERSITY - CAMPUS BIO-MEDICO UNIVERSITY

Program description

The Program title will allow Students to obtain the Master of Science Degree in “Information Systems” (“US Degree”) from PACE and the Master’s Degree in “Engineering of Intelligent Systems” (“Italian Degree”) from UCBM. The Program aims to fully integrate Italian, US, and foreign students and professors and will be open to students of all nationalities. All courses and activities will be in English at both PACE and UCBM.

- a. The duration of the Program for each Student will be two (2) years (four full-time semesters).
- b. Administrative offices of the Program will be at PACE and UCBM. The staffing and location of such offices will be determined by each institution in its sole discretion.
- c. Students moving to PACE from Italy will be allowed transfer of up to twelve (12) American credits (36 Italian CFU) from UCBM to PACE, which will count towards the fulfillment of the US Degree requirements, and eighteen (18) American credits (54 Italian CFU) from PACE to UCBM, which will count towards the fulfillment of the Italian Degree requirements. Students moving to UCBM will be allowed transfer of up to eighteen (18) credits from PACE to UCBM, which will count towards the fulfillment of the Italian Degree requirements. Further details on the study plan and credit transfers are listed Section 3.1 and 3.2 of this Agreement.

- d. Students moving to UCBM from USA will be allowed transfer of up to twenty-one (21) credits (60 Italian CFU) from PACE to UCBM, which will count towards the fulfillment of the Italian Degree requirements, and twelve (12) American CFU (36 Italian CFU) from UCBM to Pace, which will count towards the fulfillment of the US Degree requirements. Students will be allowed transfer of up to eighteen (18) credits from PACE to UCBM, which will count towards the fulfillment of the Italian Degree requirements. Further details on the study plan and credit transfers are listed Section 3.1 and 3.2 of this Agreement.
- e. The departmental coordinators of each institution shall have the role of academic advisor to all incoming students to the Program during their academic activities at both institutions.

Enrollment criteria

All students can apply to the program, but they must have completed all 1st year exams according to Section 3.1 and 3.2 of this Agreement, before their departure to the foreign institution. Students from Italy will apply using the PACE online application tool and must provide a certified TOEFL score as part of the application process for the VISA requirement. Students who are admitted by PACE will be enrolled in the MSc in “Information Systems”

Students from USA will apply using UCBM online application. UCBM will admit students who are enrolled as full-time graduate students at PACE who apply for participation in the Program. PACE students entering the program will be enrolled in the Master’s Degree programme in “Engineering of Intelligent Systems” at UCBM.

Responsibilities of students

- a. Each Student will abide by the laws and customs of the host country and by the policies and regulations of the host institution.
- b. The host institution will have the right to terminate the participation of any Student in the Program (and in any other program, service or benefit of the host institution) if at any time, and in the sole judgment of the host institution, such Student fails to maintain satisfactory academic performance or violates the policies of the host institution. The host institution will inform the other institution of any such action, subject to applicable law.
- c. Each Student must either purchase medical insurance required by the host institution or demonstrate to the satisfaction of the host institution that the medical insurance carried by or on behalf of such Student is sufficient for all purposes of the host institution.
- d. Each Student is required to have proof of immunizations satisfactory to the host institution in order to participate in the Program.
- e. The cost of any medical insurance or immunizations required pursuant to this Agreement as well as

any medical expenses or immunizations not covered by such insurance will be the personal responsibility of the Student.

f. Each Student is fully responsible for making personal travel arrangements related to the Program.

g. Each Student is fully responsible for all personal expenses related to the Program, including but not limited to textbooks, supplies, room and board, and travel costs.

h. Each Student is fully responsible for all charges related to room and board. The Student may withdraw from the Program at any time, but will be subject to the refund policy of PACE.

PROGRAM STRUCTURE

General Program Rules

Level	Master of Science
Duration	2 years
Partner Universities	Pace University and Campus Bio-Medico University

Degrees obtained	<p>If compliant with both UCBM and Pace academic requirements:</p> <ul style="list-style-type: none"> ● UCBM students will obtain the MS in Information Systems (issued by Pace) and the MS in Engineering of Intelligent Systems (issued by UCBM) ● Pace students will obtain the MS in Information Systems (issued by Pace) and the MS in Engineering of Intelligent Systems (issued by UCBM) <p>* Pace degree must always be completed first</p>
Number of students	<p>There is not a minimum of maximum number of students that will move from and to UCBM and Pace. However, both University will properly advertise this program on their official webpages.</p>
Grade/Course Recognition	<p>The tables below describe the students' mobility scenario and the activities to be completed are listed. The academic activities recognized by the partner university will be transferred according to a conversion tables commonly agreed between UCBM and Pace.</p>
Tuition Fees	<p>Students will be charged the tuition fees applicable at the institution where they study and are registered as in attendance. Students will themselves be responsible for any expenses incurred as a result of their participation in the Programme, e.g. travel and accommodation.</p>
Academic Calendar	<p>UCBM</p> <ul style="list-style-type: none"> ● Semester 1 (Fall Semester): from late September to late January ● Semester 2 (Spring Semester): from early March to early June ● Summer Break: from early July to early September <p>Pace</p> <ul style="list-style-type: none"> ● Semester 1 (Fall Semester): from early September to end of December ● Semester 2 (Spring Semester): from end of January to half of May ● Summer semester: from half of May to half of July (Summer I) and from half of July to end of August (Summer II)

Mobility Structure

UCBM students	Year 1: UCBM (Intelligent System Engineering MS) Year 2: Pace (Information Systems MS)
----------------------	---

Pace students	Year 1: Pace (Information Systems MS) Year 2: UCBM (Intelligent System Engineering MS)
----------------------	---

UCBM students must apply to Pace program before the start of the Spring Semester of the first year (March 1st). They must complete the TOEFL (Pace University TOEFL code 2635, with a minimum grade requirement of TOEFL iBT® score of 78 or TOEFL® Essentials™ score of 8.5). The J1 Visa application, required to study in USA, must be completed by the end of the Spring Semester of the first year (June 1st). The application to Pace dorms should be completed before the start of the Spring Semester of the first year (March 1st), and all the students coming from Italy will be accommodated together in the room if available. Students may contact the Pace international students office for further details.

Pace students must apply to UCBM program before the start of the Spring Semester of the first year (March 1st). The Italian Visa application, required to study in Italy, must be completed by the end of the Spring Semester of the first year (June 1st). The application to UCBM dorms should be completed before the start of the Spring Semester of the first year (March 1st), and all the students coming from USA will be accommodated together in the room if available. Students may contact the UCBM International Students Office for further details.

Final Thesis

- Students must respect the thesis procedures and deadlines from UCBM.
- Students will draft their theses during their mobility period with one UCBM supervisor.
- Students will defend their theses only at UCBM at one of the available graduation sessions: July, October, December, February or May.

ACADEMIC SCOPE

UCBM students moving to Pace

Year 1 at UCBM for Italians

Course taken at UCBM	Semester	ECTS	Recognition for Pace Degree	Credits
Digital Twins for Control, Automation and Predictive Maintenance	1	9	IT 600 Overview of Computer Networks and Internet Technology	3
Fundamentals of Artificial Intelligence: developments tools and methods	1	15	IS 612 Introduction to Coding	3
Models and methods for optimization and statistics	1	9	CS 601C Computational Statistics	3
Distributed system architecture	2	9	IS 635 Distributed Information Systems	3
Fundamentals of Cybersecurity	2	9		
Fundamentals of Robotics		9		
English language (TOEFL) (recognized for General English exam)	1	3		
		63	4 COURSES TRANSFERRED TO PACE	12

Year 2 at Pace for Italians

Course taken at Pace	Semester	Credits	Recognition for UCBM Degree	ECTS
IS 645 Information Security Management Project OR IS 648 Cyber and Professional Ethics	1	3	Ethical Hacking	6
IS 613 Database Management Systems	1	3	Deep Learning	6
IS 617 Information Systems Principles	1	3	Generative AI	6
IS 623 Information Systems Design and Development	2	3	Smart systems	6
IS 632 Business Data Communications	2	3	Innovazione e trasformazione digitale	6
IS 692 Research Project Seminar	2	3	Thesis (first part) + Il fattore umano per la trasformazione digitale	9
			Thesis integration (back in Italy)	18
		18		57

Students must first finalize the Degree at Pace and only in a second stage at UCBM.

Pace students moving to UCBM

Year 1 at Pace for Americans

Course taken at Pace	Semester	Credits	Recognition for UCBM Degree	ECTS
IS 612 Introduction to Coding	1	3	Fundamentals of cybersecurity	9
IS 613 Database Management Systems	1	3	Models and methods for optimization and statistics	9
IS 617 Information Systems Principles	1	3	Fundamentals of Artificial Intelligence: developments tools and methods	15

IS 623 Information Systems Design and Development	2	3	Digital Twins for Control, Automation and Predictive Maintenance	9
IS 632 Business Data Communications	2	3	Innovation and Digital Transformation + Human dimension in the digital transformation + English language	12
IS 692 Research Project Seminar	2	3	Fundamentals of Robotics	9
CYB 651 Cyber Intelligence Analysis & Modeling	2	3	Distributed system architecture	9
		21		72

Year 2 at UCBM for Americans

Course taken at UCBM	Semester	ECTS	Recognition for Pace Degree	Credits
Smart systems	1	6	CS 671 Computer Vision	3
Ethical Hacking	2	6	IS 645 Information Security Management Project OR IS 648 Cyber and Professional Ethics	3
Generative AI	1	6	CS 677 Machine Learning	3
Deep Learning	1	6	CS 672 Introduction to Deep Learning	3
Thesis	2	24		
		48	4 COURSES TRANSFERRED	12

Students must first finalize the Degree at Pace and only after at UCBM Bio-Medico.

APPLICATION PROCESS

1.1 UCBM students moving to Pace

- By December 15th (first semester first year) Italian students going to Pace in September of the following year (first semester second year) must apply on the online Pace website following the instruction of the host institution.
- Upon the approval of the application, each student must apply for USA J1 (student) VISA. Among the mandatory documents TOEFL English certification is needed. TOEFL code for Pace University (New York City Campus) is 2635. Students must reserve an exam date in accordance with the deadlines for the VISA interview. The VISA must be obtained within July (before the start of the first semester second year).
- UCBM students must compile the Study Plan by selecting the courses according to this agreement, and with the due date as per traditional students.
- Final confirmation of student admission to Pace is bounded by the completion of all the courses at UCBM within July (before the start of the first semester second year).
- Transfer students from UCBM must pay the tuition fees before the beginning of each semester of the second year at PACE, and will continue to pay a reduced tuition fee for the second year at UCBM.
- UCBM will send the transcript of records to Pace within September (first semester second year) to allow the credit transfer.
- Pace will complete the recognition of the transfer credits from Italy, as per this agreement, within December (first semester second year).
- Once graduated at Pace, students will come back in Italy to discuss the thesis and obtain the Italian degree, according to fees and requirements as Italian students not participating in the programs.

Pace students moving to UCBM

- By October 30th (first semester first year) Pace students going to UCBM in September of the following year (first semester second year) must apply to the UCBM Italian program on the online Italian website University as per the instruction reported in the link <https://www.studiare-in-italia.it/studentistranieri/>.
- By November 30th (first semester first year) Pace students going to UCBM in September of the following year (first semester second year) must apply on the online Italian website University for the VISA request as per the instruction reported in the link <https://www.studiare-in-italia.it/studentistranieri/>. Pace students are exempt from the academic prerequisite requirements for the enrolment in the UCBM degree (as per point 4 of the UCBM Academic Directive Regulation).
- Transfer students from PACE must pay the tuition fees before the beginning of each semester of the second year at UCBM.
- PACE students must compile the Italian Study Plan by selecting the courses according to this agreement, and with the due date as per traditional Italian students (once in Italy).
- PACE will send the transcript of records (in case PACE students will earn the Italian degree) to UCBM within September (first semester second year) to allow the credit transfer.
- UCBM will complete the recognition of the transfer credits from USA, as per this agreement, within December (first semester second year).
- Once graduated at Pace, students will come back in Italy to discuss the thesis and obtain the Italian degree, according to fees and requirements as Italian students not participating in the programs.

ADDITIONAL ACADEMIC ACTIVITIES

Pace summer courses and internship

UCBM students can attend summer courses and internship programs at Pace University always with a 15% discount in tuition and housing fees.

UCBM semester abroad and thesis

Pace students can attend single courses as well as to conduct a thesis/project at Campus Bio-Medico University during a semester in Italy.

GRADES EQUIVALENCE

Transfer courses will follow the following grades equivalence.

Courses transferred from Italy to USA		Courses transferred from USA to Italy	
30 cum laude - 30/30	A	A	30 cum laude
28 - 29/30	A-	A-	29
26 - 27/30.	B+	B+	27
24 - 25/30	B	B	25
22 - 23/30	B-	B-	23
20 - 21/30	C+	C+	21
18 - 19/30	C	C	19

SYLLABUS FOR THE TRANSFER STUDENTS

Pace University courses

IS 645 Information Security Management Project (3 credits) - Fall

This course recaps the requirements defining the roles on an information security management executive officer. This course reviews and presents all security managements activities and discusses and defines the different roles played by an executive cyber security management officer. The student develops a write up/handbook where he/she defines all roles is expected to play at every security management activity. The security management officer roles are written in terms of risk management, security planning, and security policy enforcement and auditing activities. The course also presents security guidelines, regulations, and standards that apply in information security management. This course should be considered as a final project that recaps all security management roles that the successful executive cyber security management officer should play.

IS 648 Cyber and Professional Ethics (3 credits) – Fall

The pervasiveness of computers, technology, and the Web have made it imperative that we be aware of and understand the ethical and legal implications of these forces on our personal and professional lives. Through readings, discussions and case studies, this course examines the ethical and legal issues involved in computing by investigating such questions as free speech, privacy, and intellectual property on the Internet, cyber-crimes, employer/employee issues, and professional codes of ethics.

IS 613 Database Management Systems (3 credits) - Fall

This course focuses on the theoretical and practical aspects of file and database management systems. Topics include data models hierarchical, network, relational; data structures, storage structures, storage devices and their relation to data access; importance of data as an organizational resource; data management, sharing availability, security, integrity and consistency; data independence and conceptual data models. Examples of database applications and software packages are selected.

IS 617 Information Systems Principles (3 credits) - Fall

This course examines managerial information requirements for operation, control, organization and planning, and the ways in which information systems are used to achieve these organizational objectives. Topics include general systems concepts and the systems approach to organization; role of computer technology in information systems design; economics of information; importance of data as a major organizational resource; information resource management; overview of information systems components: software, hardware, people, data flows and functional subsystems and their relation to the whole system. Examples are selected from such major subsystems as corporate planning, marketing, manufacturing, accounting, finance and personnel.

IS 623 Information Systems Design and Development (3 credits) - Spring

This course provides an introduction to Systems Analysis and Design. Topics include analyzing the business case, requirements modeling, data and process modeling, and development strategies, with a focus on project management. Students also learn about output and user interface design, data storage design, systems architecture, implementation, and systems operation, support, and security.

IS 632 Business Data Communications (3 credits) - Spring

The study of all forms of electronic communication in organizations today. Course topics include data communications hardware and media, protocols and standards, local area and wide area networking, network management, telecommunications software and application design.

IS 692 Research Project Seminar (3 credits) - Spring

This course confronts the student with major contemporary debates and key issues of information systems and information technology, and provides a framework within which to develop a research project effort. This seminar discusses current methods used in information systems research, including quantitative, qualitative and conceptual approaches. The student will learn how to define a research issue, how to select an appropriate research method, and how to design a research plan. Each student will select a project area, and search the literature (formal and informal) for relevant material. These materials will be shared with the seminar class, and interactive peer discussion and critiques will assist each student in the development of a project report. Each student will prepare a research paper with a literature review, appropriate bibliography, definition of a research question, a research design and an analysis of expected results. Students will be evaluated and graded based upon class presentations, interim project work and the delivery of a final written project report and oral presentation to the seminar.

UCBM University courses

Cybersecurity (9 ECTS) - Spring

The course aims to provide the learner with the basic concepts of cyber security in order to permit to the student to introduce those elements in the design stage, management, maintenance and dissolution of a cyber-physical system. The course illustrates both the basics for preparing, organizing and monitoring a cyber attack and the main methodological, technological and operational tools to prevent such threats. The course focuses in particular on the problems of the monitoring systems and the control of OT systems, analyzing the effects on a cyber-attack to a physical system and to control systems. Furthermore, the course provides a brief overview about the techniques of social engineering and the legal aspects related to the cyber-security.

Computer vision (9 ECTS) - Fall

The course aims to teach students the fundamental principles and applications of Computer Vision (CV), i.e. the technologies that lie at the heart of modern Artificial Intelligence (AI) applications that can perceive, understand and reconstruct the complex visual world and that deal with developing the set of processes that aim to create a model of the real world starting from two-dimensional images. CV is one of the fastest growing and most challenging AI disciplines in industry and academia today. This course has been designed to open the doors of this discipline to students who are interested in learning about its fundamental principles and important applications.

Deep Learning for Big Data (9 ECTS) - Fall

The course will explore the main Deep Learning approaches based on deep neural networks for the analysis of multidimensional data. Deep learning algorithms are general nonlinear models that are capable of learning features directly from data, making them an excellent choice for robotic, natural language processing, healthcare, and computer vision applications. Concepts and technologies relating to Big Data analysis will be explored. The purpose of the final project will be to learn how to independently address a real or laboratory problem by applying a neural network model to create an application or to experimentally evaluate the ability of Deep Learning approaches in various contexts. The course will consist of two parts, one consisting of theoretical lectures and a second part carried out in a concerted laboratory on the application of the models analyzed using the Python language.

Ethical Hacking (9 ECTS) - Fall

The course aims to provide students with advanced cybersecurity concepts in order to allow them to manage and conduct vulnerability assessment and penetration testing activities on IT and OT infrastructures in full autonomy. Furthermore, the course aims to define solutions useful for the construction of one's own suite necessary for ethical hacking activities.

The course will deal with: Setting a machine for VA/PT activities (introducing to Unix world and arranging KALI Linux); Analyze attacks and vulnerabilities; perform penetration testing and finally conducting a vulnerability assessment.

Project Management (9 ECTS) - Fall

The course aims to provide:

- The fundamental notions, both theoretical and practical, on software development project management processes
- Knowledge of project management areas of expertise, as well as practical knowledge of related techniques and tools
- The value chain, process quality standards, process analysis and representation, projects in organizations
- Awareness of innovation processes and the development of soft skills to face the digital transition in a co-operative and collaborative perspective.
- The principles of Design Thinking.

Strategic Management and Valuation (9 ECTS) - Fall

The course aims at providing students with the elements to make corporate strategy decisions, and financial valuations of projects and firms. Students will understand the various strategies that can be undertaken by firms, through the analysis of the external and the internal environment of the organization. Moreover, business strategy and corporate strategy options will be dissected. In addition to this, tools for business valuation will be considered theoretically and empirically, with the aim to gain knowledge on how to select best project to be started, and how to estimate the value of an entire firm. In such a way, it is intended to give students an overview of how it is possible to compete in the market, how to choose which project to start, and how to assign value to organizations.

Digital Twins for Control, Automation and Predictive Maintenance (9 ECTS)

The course aims to provide theoretical and practical knowledge on the use of modern control techniques based on the concept of state and how it can be deduced through the use of a Digital Twin. Students will learn to use advanced methodologies for modeling and simulating real systems integrating optimal control, observers such as the Kalman filter, and fault detection techniques. Knowledge of the main elements of industrial automation with particular reference to Programmable Logic Controllers (PLC) and their programming languages. Use of Digital Twin algorithms within industrial automation schemes.

Distributed System Architecture (9 ECTS)

The course has the aim of providing the student with knowledge and skills related to hardware and software architectures of information systems with particular emphasis on systems capable of acquiring, storing, and processing, offline and online, data from sensors and other data sources distributed in the physical environment, involving intelligent systems for intermediate data processing and tuning of the involved systems. The student is also introduced to methods and techniques for configuring and scaling such systems in order to optimize their performance.

Fundamentals of Artificial Intelligence: developments tools and methods (15 ECTS)

The course consists of two modules: Development Tools and Methods.

The learning objectives of the module Development Tools provide the student with knowledge and skills necessary to use high-level programming languages for the development of software applications oriented to data processing. The student will deepen the use of programming methods and tools allowing the efficient development of software through the generation and reuse of high-quality modular components. Programming skills are applied to strategies and algorithms for data analysis in Artificial Intelligence applications.

The learning objectives of the module Methods is to acquire the basic concepts of Machine Learning (ML) and of symbolic AI, i.e., the systems and algorithms that rely on observations of data for the synthesis of new knowledge. For example, learning can take place by capturing features from examples, data structures or sensors, to analyse and to evaluate the relationships between the observed variables.

In particular, the student should:

- Acquire an adequate level of knowledge of the theoretical foundations of the main computational models for learning (e.g. supervised and unsupervised learning, classifiers and regressors, distance-based and model-based learning models, linear and kernel classifiers, evolutionary models, time series mining, etc.);

- Understand methods for the synthesis of new knowledge;
- Understand the fundamentals of methods for defining an experimental procedure and for performance evaluation;
- Understand the potential of AI for the development of decision support systems, data mining and big data analytics;
- Learn the use of appropriate development environments for the application of AI methods.

Smart systems (6 ECTS)

The course aims at providing students with basic knowledge about measurement systems, sensors and computational techniques for the analysis and interpretation of the results. The course also aims at providing students with theoretical and programming elements about sensors-processors interfaces.

Generative AI (6 ECTS)

The course aims at providing students with knowledge and competences on hardware and software information system architectures. Particular attention will be devoted to the systems able to acquire, memorize and elaborate, both offline and online, data coming from sensors and other sources in the physical environment, involving systems for data processing and tuning.

Thesis - Spring

The student, under the supervision of a Professor of Campus Bio-Medico University, will develop a scientific project based on a research or practical experience.
