Curriculum 1 Cyberphysical system

CYBER-PHYSICAL SYSTEMS - GE

Codice	Disciplina	Settore	CFU	Tipologia/Ambito	Obiettivi Formativi	Propedeuticità
80394	MASTER THESIS		27	27 CFU PROVA FINALE Per la Prova Finale		-
80551	TECHNOLOGIES FOR INDUSTRIAL AUTOMATION	ING-INF/07	6	6 CFU AFFINI O INTEGRATIVE Attività Formative Affini o Integrative	The course describes the technologies and the solutions used for the Industrial Automation. The main items of the course are: different environment for IA (factory, continuous process, technological networks, building automation), instrumentation and actuators, Intelligent Field Devices, fieldbus, architectures for IA, Industry 4.0 (Smart Manufacturing).	-
98458	SMART SYSTEMS CONTROL AND APPLICATIONS	ING-INF/04	6	6 CFU CARATTERIZZANTI Ingegneria Informatica	The course aims at providing modeling and methodological approaches to sensing, actuation, and control in order to describe and analyze a system, and make decisions based on the available data in a distributed, predictive and/or adaptive manner, thereby performing "smart actions". The student will approach such smart systems by studying proper models and methods in different applicative contexts, such as smart power grids, connected autonomous vehicles and platooning, energy efficient buildings, distributed logistics, and environmental monitoring.	-
98457	COOPERATIVE ROBOTICS	ING-INF/04	6	6 CFU CARATTERIZZANTI Ingegneria Informatica	The course presents modern task-priority based control approaches to complex robotic systems. A general framework capable of controlling robotic structures ranging from fixed-base arms to dual arm mobile manipulators is discussed. The same framework is extended to cooperative anipulation by multiple agents in a distributed way.	-

3 CFU tra i seguenti insegnamenti:

100276	ITALIAN LANGUAGE FOR FOREIGN STUDENTS (2 LEVEL)		3	3 CFU ALTRE ATTIVITA' Ulteriori Conoscenze Linguistiche		-
94977	LINGUA INGLESE 2		3	3 CFU ALTRE ATTIVITA' Ulteriori Conoscenze Linguistiche	Provide a level of knowledge and understanding of the English language equivalent to the B2.1 level of the European framework. At the end of the course the student will be able to: - understand the key topics of a complex text on both concrete and abstract topics, including technical discussions; - express themselves with a certain fluency and spontaneity, interacting with native speakers effortlessly for both parties; - produce a clear and detailed text on a wide range of topics and express an opinion on a topical issue, indicating the advantages and disadvantages of the different options.	-

And 2 courses among

80190	EMBEDDED SYSTEMS	ING-INF/04	6	6 CFU A SCELTA A Scelta dello Studente	What is an embedded system and what are its main characteristics. Introduction to the basic hardware needed for the realization of an embedded system. Architectures of processing systems. Specific architectures for embedded systems. Specific tools for developing code for embedded systems. Programming embedded systems. Communication protocols. Scheduling	-
86798	MACHINE LEARNING AND DATA ANALYSIS	ING-INF/05	6	6 CFU A SCELTA A Scelta dello Studente	Students will be provided with advanced skills related to data analysis. Students will learn insights on data mining methodologies and specific applications of these methodologies to particular data organization.	-
80171	TECHNOLOGIES FOR WIRELESS NETWORKS	ING-INF/03	6	6 CFU A SCELTA A Scelta dello Studente	The course aims to provide a framework for all major network technologies that use wireless (wireless) transmissions, considering application areas and architectures both from a structural and protocollary point of view. More specifically, the main objective is to provide knowledge and insight on the following topics: i) Introduction to architectures with the classification of wireless networks in mobile cellular systems, technologies for wireless local area networks (LAN) and Personal-Sensor-Body Area Networks (PAN, SAN, and BAN). ii) The cellular mobile radio networks from the second generation (2G-GSM) and evolutions (GPRS and EDGE), to the third generation (3G-UMTS) and the fourth (4G, LTE) for ending with the current 5G technology. iii) The standard for IEEE802.11 (Wi-Fi) WLAN networks, described in all its evolutions starting from version 11b up to version 11ax. iv) Personal communications through the Bluetooth standard, including the latest variants like Bluetooth low-power. The result of learning is to give the student, oriented to a specific field of Engineering, the ability to understand the different technologies of wireless networks and make effective design choices for their effective use.	-

Curriculum 2 Industrial informatics

INDUSTRIAL INFORMATICS - GE

Codice	Disciplina	Settore	CFU	Tipologia/Ambito	Obiettivi Formativi	Propedeuticità
80394	MASTER THESIS		27	27 CFU PROVA FINALE Per la Prova Finale		-
80551	TECHNOLOGIES FOR INDUSTRIAL AUTOMATION	ING-INF/07	6	6 CFU AFFINI O INTEGRATIVE Attività Formative Affini o Integrative	The course describes the technologies and the solutions used for the Industrial Automation. The main items of the course are: different environment for IA (factory, continuous process, technological networks, building automation), instrumentation and actuators, Intelligent Field Devices, fieldbus, architectures for IA, Industry 4.0 (Smart Manufacturing).	-
80172	METHODS AND MODELS FOR DECISION SUPPORT	MAT/09	6	6 CFU AFFINI O INTEGRATIVE Attività Formative Affini o Integrative	Modeling and solving complex decision problems. Applications to manufacturing planning and scheduling and to logistics (network flow, location and vehicle routing). Integer programming, heuristic and metaheuristic models and methods for combinatorial optimization problems are studied. Fundamental concepts for solving multicriteria problems are introduced and multi-objective optimization methods are presented	-
80167	PRODUCTION SYSTEMS	ING-INF/04	6	6 CFU CARATTERIZZANTI Ingegneria Informatica	Under the title 'Production Systems' one can place very many different problems. This course is related with the decomposition of a planning and control problem of a production systems in different subproblems. For any of the subproblems after a analysis process, a set of solving techniques will be considered. Such solving techniques have to be integrated in possible solution of the 'main' production problem.	-

3 CFU tra i seguenti insegnamenti:

100276	ITALIAN LANGUAGE FOR FOREIGN STUDENTS (2 LEVEL)		3	3 CFU ALTRE ATTIVITA' Ulteriori Conoscenze Linguistiche		-
94977	LINGUA INGLESE 2		3	3 CFU ALTRE ATTIVITA' Ulteriori Conoscenze Linguistiche	Provide a level of knowledge and understanding of the English language equivalent to the B2.1 level of the European framework. At the end of the course the student will be able to: - understand the key topics of a complex text on both concrete and abstract topics, including technical discussions; - express themselves with a certain fluency and spontaneity, interacting with native speakers effortlessly for both parties; - produce a clear and detailed text on a wide range of topics and express an opinion on a topical issue, indicating the advantages and disadvantages of the different options.	-

12 CFU tra i seguenti insegnamenti:

100051	SISTEMI ERP	INF/01	6	6 CFU A SCELTA A Scelta dello Studente	Acquisire i concetti fondanti di un'architettura di un sistema di Enterprise Resource Planning e maturare esperienza diretta in un ambiente di sviluppo molto diffuso presso l'impresa.	-
98458	SMART SYSTEMS CONTROL AND APPLICATIONS	ING-INF/04	6	6 CFU A SCELTA A Scelta dello Studente	The course aims at providing modeling and methodological approaches to sensing, actuation, and control in order to describe and analyze a system, and make decisions based on the available data in a distributed, predictive and/or adaptive manner, thereby performing "smart actions". The student will approach such smart systems by studying proper models and methods in different applicative contexts, such as smart power grids, connected autonomous vehicles and platooning, energy efficient buildings, distributed logistics, and environmental monitoring.	-
80171	TECHNOLOGIES FOR WIRELESS NETWORKS	ING-INF/03	6	6 CFU A SCELTA A Scelta dello Studente	The course aims to provide a framework for all major network technologies that use wireless (wireless) transmissions, considering application areas and architectures both from a structural and protocollary point of view. More specifically, the main objective is to provide knowledge and insight on the following topics: i) Introduction to architectures with the classification of wireless networks in mobile cellular systems, technologies for wireless local area networks (LAN) and Personal-Sensor-Body Area Networks (PAN, SAN, and BAN). ii) The cellular mobile radio networks from the second generation (2G-GSM) and evolutions (GPRS and EDGE), to the third generation (3G-UMTS) and the fourth (4G, LTE) for ending with the current 5G technology. iii) The standard for IEEE802.11 (Wi-Fi) WLAN networks, described in all its evolutions starting from version 11b up to version 11ax. iv) Personal communications through the Bluetooth standard, including the latest variants like Bluetooth low-power. The result of learning is to give the student, oriented to a specific field of Engineering, the ability to understand the different technologies of wireless networks and make effective design choices for their effective use.	-