UNIVERSITY POLITEHNICA OF BUCHAREST

MASTER PROGRAMS IN FOREIGN LANGUAGES

2020 - 2021

CONTENTS

1 Field of study: Chemical Engineering

1.1 Biomaterials for tissue engineering (taught in English)

a) Faculty of Engineering in Foreign Languages

b) Short description and main objectives:

The master's program proposed the following general objectives:

- Specialization and improvement of pre-Bologna university graduates: - engineers; - chemists; - biochemists; - doctors; - biologists; - pharmacists; - expert in the above enumerated categories.

- Empowering and improving the need of undergraduate/ graduates of Bologna cycle for carrying out research, to search quality consultancy and expertise in the field of medical engineering and biomaterials science.

With the proposed courses - which include teaching, practice and research – the master program ensures both a fundamental and applied training in engineering sciences (especially materials science and bioengineering) and biomedical applications. The master program brings together basic and applied sciences disciplines. In the context of European requirements, it is necessary the development of trained specialists able to work in proper conditions of safety and quality in research laboratories and bio-medical facilities, and to develop and implement new approaches in regenerative medicine, and biomaterials and tissue engineering. This program aims to combine between engineering, chemistry, materials science, biology, anatomy, physiology and physics, ensuring the development, improvement and introduction in the national and international HR staff very competitive specialists on an emerging and interesting area- medical engineering. The program directly addresses the staff working in the fields of materials engineering, regenerative medicine, development of prosthetic devices, biochemistry, pharmacy, and all those interested in the vast field of medical engineering and biomaterials for applications in tissue regeneration. Knowing the great national and international interest, new approaches and methods for obtaining, investigation and analysis of materials with biomedical applications has become a necessity acute for those working in the fields of medical engineering and regenerative medicine.

c) Other information

Master program entitled Biomaterials for tissue engineering will provide: developing skills in sciences, particularly medical engineering, materials science and engineering and biochemistry (deepening and broadening of knowledge, skills and abilities necessary for training specialists); acquisition of double / multiple skills by studying interdisciplinary sciences during the master's program; formation of skills related to interpersonal communication, teamwork, rapid insertion of human resources on the market; empowerment and improvement of university graduates with specialized knowledge (fundamental science -

applied science): Bologna, pre-Bologna students, engineers, biochemists, physicians, biologists etc.; acquiring skills to identify and solve current biomedical problems and asses efficiency of currently available ones; practicing communication skills and problem solving (questioning); developing skills necessary for the design of biomaterials applicable in molecular, cellular and / or tissue engineering; development of interdisciplinary skills in line with policies and strategies specific in various medical specialties in the fields of engineering, material science, biochemistry, medicine: theoretical and applicative knowledge regarding the potential of biochemistry and implications in tissue reconstruction and regeneration of tissue, theoretical and practical Skills will enable student's work in adequate conditions in research laboratories and innovation in the field of regenerative medicine, but also in some industrial areas that are aiming at the development of biomedical instruments on regeneration and remodeling of tissues and organs, such as for obtaining organs and tissues *in vitro* correlation of the properties of morphological, physiological and molecular traits of cells and tissues with the development of tissues, organs and organisms with specific characteristics and the possibility of handling them through the application of engineering techniques; use the processes and principles of cellular signaling and tissue development to develop methods and approaches for efficient regeneration and tissue engineering; preparation and characterization of biomaterials for biomedical use, mainly in regenerative medicine; the application of knowledge and skills acquired through learning and practice work in a dedicated tissue culture laboratory by using biomaterials; knowledge and understanding of stem cell biology and applications, as well as the modalities of their differentiation to different cell types and molecular mechanisms that participate in tissue regeneration; using the principles for understanding biological processes to obtain reproducible results and the appropriate interpretation of the information provided by them; understand and correlation of physiological processes with molecular and cellular engineering approaches to change / develop applications useful for tissue engineering and regeneration; linking physiological processes with different molecular and genetic engineering methods applicable at the molecular and supramolecular structures; using engineering principles, molecular and supramolecular assemblies useful in the design of new structures for tissue regeneration or reconstruction and modification of cells for biomedical applications; Determine or check the main structural and compositional characteristics of biomaterials, by using advanced characterization methods and techniques; linking concepts of materials science with notions of biophysics, biology and anatomy adequate to characterize the structural, micro and nanostructure of biomaterials, given the interdependence between structure and physicochemical properties of functional biomaterials; Linking various functional, morphological and metabolic features with debilitating tissue disorders; understanding the necessity of development of prosthetic devices and medical interest materials for improving the quality of life in patients with debilitating diseases of different tissues or to increase their life expectancy; use a variety of traditional and complementary methods of training and evaluation - questioning, theoretical and practical projects; ability to analyze and evaluate the

work in the field and the gained experience; ability compiling research projects and exploitation of research results; double degree is possible, incoming Erasmus students, partnership to industry/companies, possibility to develop master thesis related to industry, etc.).

All the courses of the program are open for Erasmus incoming students.

d) website: http://ing.pub.ro/admitere-master-biote-biomateriale-pentru-ingineria-tesuturilor/

e) Contact person: Mr. Alexandru Mihai GRUMEZESCU, agrumezescu@upb.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Lab work	Project	ECTS
1	1	Tissue biochemistry	2	0	0	0	4
1	1	Cell and tissue biology	2	0	2	0	4
1	1	Stem cells and regenerative medicine	1	0	1	0	4
1	1	Nano medicine: from concept to current and emerging applications	2	0	2	0	4
1	1	Nano biomaterials for tissue engineering	2	0	0	0	4
1	1	Research practice	12				10
1	2	Molecular and cellular engineering	2	0	2	0	4
1	2	Biomaterials characterization by advanced techniques	1	0	3	0	4
1	2	Tissue engineering and regenerative medicine	2	0	2	0	4
1	2	Debilitating diseases of tissues	2	0	0	0	4
1	2	Biomedical devices and prostheses	2	0	0	0	4
1	2	Research practice	12				10
2	3	Nano biotoxicology	2	0	0	0	4
2	3	Advanced techniques for the characterization of biological active substances	1	0	3	0	4
2	3	Medical imaging for tissue reconstruction and regeneration	1	0	3	0	4
2	3	Mechanisms of tissue regeneration and remodeling	2	0	0	0	4
2	3	*In vitro* and *in vivo* models for tissue reconstruction and regeneration	2	0	2	0	4
2	3	Research practice	12				10
2	4	Research practice and prepare dissertation	27				28
2	4	Ethics	1				2

1.2 Advanced Materials Processing and Design – (taught in English)

a) Faculty of Engineering in Foreign Languages

b) Short description and main objectives:

The master program proposed the following general objectives:

- Specialization and improvement of bachelor graduates in the field of processing, characterisation and testing of the materials. The following candidates are eligible for admission: *i)* engineers, especially chemical, materials science, medical engineers, bioengineers, etc.; *ii)* chemists from different topics including analytical chemists, environmental chemists which are extensively using materials in their activity; *iii)* biochemists; *iv)* medical doctors, both human and veterinary divisions; *v)* biologists; *vi)* pharmacists; *vii)* experts in the above enumerated categories.

- Empowering and improving the need of undergraduate/ graduates of Bologna cycle for carrying out research, to search quality consultancy and expertise in the field of processing and testing the quality of the developing materials and devices.

With the proposed courses - which include teaching, practice and research – the master program ensures both fundamental and applied training in materials processing, design, characterisation and testing of materials and derived devices in the field of industrial, medical, environmental, energy, electric or electronic applications. The program is mainly focused on developing knowledge and skills to enable graduates to identify current problems/challenges and especially to propose solutions and to manufacture materials appropriate to the desired application.

The master program brings together basic and applied sciences disciplines. The structure of the study plan is especially developed to assure one semester of mainly basic disciplines while the most of the second semester of the first year is devoted to the main processing techniques to manufacture 0-3D materials according to their envisaged applications. The first semester of the second year will be devoted to the discovery of the most important characterization and testing techniques and such, allowing in the second semester full-time involvement for research activities and finalizing the dissertation.

In the context of European and Global Requirements related to development of novel or improved materials, with increasing standards and diversity, with an accentuated degree of decentralisation it is important to learn young master students to develop materials with imposed characteristics and performances. Currently, by our knowledge, in Romania there is no such master fully devoted to processing and design of materials and absolvents can easily find positions in existing SMEs or, with the aim of the Start-up Nation or other programs to develop their proper business.

This program aims to combine chemistry, engineering, materials science with biomedical, environmental, energy, electric or electronic applications.

c) Other information

Master program entitled Advanced Materials Processing and Design will provide:

- developing skills in sciences, particularly, processing, design, characterization and testing of 0-3D materials (deepening and broadening of knowledge, skills and abilities necessary for the absolvents of this master program);
- acquisition of multiple skills by studying interdisciplinary sciences during the master's program; the core of the master program being the need of processing of materials and to develop materials and devices for household, medical, environmental, energy, electric and electronic applications;
- formation of skills related to interpersonal communication, teamwork, rapid insertion of human resources on the market;
- empowerment and improvement of university graduates with specialized knowledge (fundamental science - applied science) able to adapt for the need of the market being able to use their knowledge in various fields, as presented above;
- acquiring skills to identify the challenges in the fields of materials sciences and various connected fields (which are using materials) and solve these issues based on the acquired theoretical knowledge and practical skills:

  - developing knowledge, capacity of modern documentation and practical skills necessary for the design and manufacture materials for household applications;

  - developing knowledge, capacity of modern documentation and practical skills necessary for the design and manufacture materials for biomedical applications;

  - developing knowledge, capacity of modern documentation and practical skills necessary for the design and manufacture materials for energy applications;

  - developing knowledge, capacity of modern documentation and practical skills necessary for the design and manufacture materials for electronic applications;

- theoretical and practical skills will enable student's work in adequate conditions in research laboratories and innovation in the above mentioned fields, but also in any industrial areas dealing with materials;
- correlation of the properties and performances of the materials with the morphology, composition and routes of processing;
- Determine or check the main structural and compositional characteristics of the materials, by using advanced characterization methods and techniques;
- Linking concepts of materials science with notions of physics, mechanic, biology, electric characteristics and evaluation of the performances of these materials according to the envisaged applications;
- Ability compiling research projects and exploitation of research results
- Practicing communication skills and problem solving (questioning)

All the courses of the program are open and encourage Erasmus exchanges.

d) website: http://ing.pub.ro/admission/master/procesarea-si-designul-avansat-al-materialelor/

e) Contact person: Mr. Anton FICAI, anton_ficai81@yahoo.com

f) Curriculum:

Year	Sem	Subject name	Weekly number of hours				ECTS
			Lecture	Tutorial	Lab work	Project	
1	1	Advanced methods of synthesis of substances and materials	2		2		5
1	1	Advanced Methods of Surfaces and Interfaces Functionalization	2		1		5
1	1	Correlations of composition – synthesis – processing – properties in term of functions of use of materials	2		2		5
1	1	CAD of Materials with Predetermined Morpho-Structural Features	2		1	**2**	5
1	1	How to prepare a scientific work		2			2
1	1	Scientific Research	14				10
1	2	Multifunctional and smart oxide materials	2		0		4
1	2	Advanced manufacturing techniques of 3D materials	2		2		5
1	2	Advanced manufacturing techniques of 2D materials	2		2		5
1	2	Advanced manufacturing techniques of 1D materials	2		1		3
1	2	Advanced manufacturing techniques of 0D materials	2		1		3
1	2	Scientific Research	14				10
2	3	Advanced microscopy techniques	2	-	1	-	4
2	3	Advanced Techniques of Spectrometric Analysis	2	-	1	-	4
2	3	X-Ray Diffraction and Fluorescence	2	-	1	-	3
2	3	Complex thermal analysis	2	-	1	-	4
2	3	Design and manufacturing of materials with special applications	0	-	-	2	3
2	3	Research practice	14				10
2	4	Research practice and dissertation preparation	27				28
2	4	Ethics	1				2

1.3 Smart Polymers and Biopolymers (taught in English)

a) Faculty of Applied Chemistry and Materials Science

b) Short description and main objectives:

Smart Polymers and Biopolymers (SPB) program focuses on the companies demands from the industry of polymers and biopolymers. These refer to novel fabrication techniques for polymer products such as: advanced polymer membranes, special adhesives with higher lifetime, conductive materials with specific properties for each substrate, innovative processing methods for thermoplastics in automotive and electrochemical industry, polymeric nanomaterials with carbonic content etc.

The new master program is oriented on top subjects in the field of smart polymers: smart membranes, smart inorganic polymers, chemical modification of polymers and biopolymers for medical and biological applications, protein engineering, non-destructive testing methods for polymers and biopolymers, bioreactors for smart materials, top methods in polymer processing etc.

c) Other information

All the courses of the program are open for Erasmus incoming students.

We also developed strong partnerships with different European Universities: University of Angers, France; University of Patras, Greece; ETH Zurich, Switzerland; University of Bochum, Germany; Catholic University of Leuven, Belgium; University of Strasbourg, France; New University of Lisbon, Portugal; University of Ghent, Belgium; Arctic University, Norway.

d) Website:http://www.chimie.upb.ro/educatie/masterat-smart-polymers-and-biopolymers

e) Contact person: Mr. Horia Iovu, horia.iovu@upb.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Lab work	Project	ECTS
					Weekly number of hours		
1	1	Smart polymer membranes	2	0	2	0	4
1	1	Computer-aided design of polymers and biopolymers	2	0	0	2	4
1	1	Smart inorganic polymers	2	0	1	0	4
1	1	Smart adhesives	2	0	1	0	4
1	1	Advanced conductive polymers	1	0	2	0	4
1	1	Research practice			12		10
1	2	Advanced characterization of polymers and biopolymers	2	0	2	0	4
1	2	Top methods for polymer processing	2	0	2	0	4
1	2	Chemical modification of polymers and biopolymers for medical and biological applications	2	0	2	0	4
1	2	Biopolymers based hybrid materials	2	0	2	0	4
1	2	Proteins engineering	2	0	2	0	4
1	2	Research practice			10		10
2	3	Microscopy testing of polymers and biopolymers	2	0	2	0	4
2	3	Oligomers for advanced materials	2	0	1	0	4
2	3	Bioreactors for smart materials	2	0	1	0	4
2	3	Additives for polymer and biopolymers	2	0	2	0	4
2	3	Carbon-based polymeric nanomaterial for bioengineering applications	2	0	2	0	4
2	3	Research practice			12		10
2	4	Research practice			20		20
2	4	Prepare dissertation			10		10

2   Field of study: Electrical Engineering

2.1   Integrated electrical systems engineering in vehicles (taught in English)

a)   Faculty of Electrical Engineering

b)   Short description and main objectives:

The master program Integrated electrical systems engineering in vehicles is organized and coordinated by the Electrical Engineering Faculty from the University POLITEHNICA of Bucharest (UPB), with support and participation of the following faculties from UPB: Faculty of Transportation and Faculty of Automatic Control and Computer Science.

The main purpose of the program is to specialize students at a high scientific and technological level, through the formation of competences according to the current requirements of employers in the field of automotive industry, especially the main industrial partner of the program, Renault Romania Group.

The specific objectives of the program are:

- Assimilation of the specific aspects in the field of electrical systems integrated in vehicles (techniques, technologies, methods, algorithms, concepts, modeling, simulation, optimization, etc.);

- Knowledge and use of the hardware tools (equipment for measurements and testing) and the software packages (for programming, modeling, simulation, design, component optimization, systems and project management) from field of electrical systems integrated in vehicles.

c)   Other information

We have a strong partnership with Renault Technologie Roumaine, „VALAHIA" University of Târgovişte, Technical University of Cluj-Napoca. Similar master programs are organized in the two universities.

We encourage our master students to develop master thesis with industrial partners, especially Renault Technologie Roumaine and its related companies from automotive domain.

All the courses of the program are open for Erasmus incoming students.

d)   Website: http://www.electro.pub.ro/master/planuri-de-invatamant/

http://www.electro.pub.ro/master/ghidul-masterandului/

e)   Contact person: Mr. Mihai Iulian REBICAN, mihai.rebican@upb.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Development and Management of Object Oriented Software Projects	2	0	2	0	4
1	1	Power Electronics Structures and Controls	2	0	2	0	4
1	1	Systems Engineering Management	2	0	1	0	4
1	1	Electromagnetic Compatibility in Distributed Systems	2	0	1	0	4
1	1	Vehicle Dynamics and Mechanics	2	0	1	0	4
1	1	Research/Practice 1	0	0	0	0	10
1	2	Interconnecting Devices and Interfaces	2	0	2	0	5
1	2	Sensors and Transducers for Vehicles	2	0	2	0	5
1	2	Electric Propulsion Systems for Vehicles	2	0	2	0	5
1	2	Vehicle Architecture	1	0	2	0	5
1	2	Research/Practice 2	0	0	0	0	10
2	3	Security and Functional Safety of Vehicle Electrical Systems	1	0	1	0	4
2	3	Numerical Simulation of Embedded Systems	2	0	2	0	4
2	3	Modeling, Simulation, Programming and Testing of Integrated Electromechanical Systems	2	0	2	0	4
2	3	Materials, Specific Technologies and Vehicles Environment Impact	2	0	1	0	4
2	3	Integrated Data Acquisition Systems	1	0	2	0	4
2	3	Research/Practice 3	0	0	0	0	10
2	4	Research/Practice for the Dissertation	0	0	0	0	28
2	4	Ethics	1	0	0	0	2

3 Field of study: Power Engineering

3.1 Energy Engineering (taught in English)

a) Faculty of Engineering in Foreign Languages in collaboration with Power Engineering Faculty

b) Short description and main objectives:

The master program Energy Engineering is organized and coordinated by the Power Engineering (Energetics) Faculty and the Faculty of Engineering in Foreign Languages (FILS) from the University Politehnica of Bucharest (UPB), with support and participation of the following faculties from UPB: Applied Chemistry and Materials Science, Mechanical Engineering and Mechatronics, Electronics, Telecommunications and Information Technology.

The focus of the program is to produce technically versatile graduates capable to tackle independently new problems and today challenges of scientific research, industrial applications, and management in various fields of energy engineering, including:
-    flow, heat, and mass transfer phenomena in energetic systems,
-    material science for energy applications and the environmental impact of energy production.

c) Other information

✓   The master program Energy Engineering is organized and planned to be compatible, in curriculum and scientific research directions, with the master program Energy Science and Engineering from T.U. Darmstadt, Germany.

✓   This program yearly receives incoming Erasmus students for one semester or one entire year.

d) Contact person: Mr. Cristian Dincă, cristian.dinca@upb.ro

e) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Renewable Energies, Energy Scenarios and Climate Protection	2	1	0	0	4
1	1	Energy Technologies in Mechanical Engineering	2	0	1	0	4
1	1	Chemistry and Material Science for Energy Engineering	2	0	2	0	4
1	1	Energy Finance	2	1	0	0	4
1	1	Continuum Mechanics and Thermodynamics	2	1	0	0	4
1	1	Scientific research	0	0	0	12	10
1	2	Modelling turbulent flows and heat transfer	2	0	2	0	4
1	2	Energy Technologies in Buildings – Smart Buildings	2	0	1	0	4
1	2	Energy systems I (classical energy and low emissions)	2	0	1	0	4
1	2	Energy Supply and Environmental Protection	2	0	1	0	4
1	2	Energy systems II (regenerative energy)	1	2	0	0	4
1	2	Environmental and economical aspects of energy conversion	1	2	0	0	4
1	2	Electrical Engineering and Information Technologies	1	2	0	0	4
1	2	Interdisciplinary research project	0	0	0	12	10
2	3	Electrochemistry	2	0	1	0	4
2	3	Chemical kinetics	2	0	1	0	4
2	3	Electro-chemistry in energy applications-converter devices	2	0	1	0	4
2	3	Material science of thin films and Rheology	2	0	2	0	4
2	3	Electro-chemistry in energy applications –storage devices	2	0	1	0	4
2	3	Principles of Carbon Capture and Storage	2	0	1	0	4
2	3	Scientific research	0	0	0	12	10
2	4	Scientific research, practice and dissertation elaboration	0	0	0	27	28
2	4	Ethics	1	0	0		2

4   Field of study: Electronics, Telecommunications and Information Technology

4.1   Advanced microelectronics (taught in English)

a)   Faculty of Electronics, Telecommunications and Information Technology

b)   Short description and main objectives:

The Advanced Microelectronics (AM) program offers a systematic and coherent frame for Mixed Signal Circuits Design and Application studies. The AM graduate will be able to work independently or guided by the project leader in the Microsystems Design and Application. The AM program provides the knowledge for Analog and Mixed Signal Circuits and Microsystems analysis, design and evaluation for both

(1) Silicon implementations up to System on Chip level and

(2) Specific application development from prototype level up to finite product.

The AM master program responds to the Romanian and international labor market strong demand for analog and mixed signal circuits and systems designers, with a strong emphasis on automotive applications.

c)   Other information

The master program is development in partnership with Infineon Technologies.

All the courses of the program are open for Erasmus incoming students.

d)   Website:

http://www.electronica.pub.ro/images/continut/admitere/masterat/04-prezentare.pdf

e)   Contact person: Mr. Claudius DAN, claudius.dan@upb.ro

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Analog Blocks	3		2		5
1	1	Microcontrollers and Embedded Systems	2		2		5
1	1	CAD for Integrated Circuits Design	2		1		4
1	1	Digital System Design: Project 1				2	3
1	1	Automotive Electronics: An Industrial View	2				3
1	1	Research Activity and Practical Work S1	12				10
1	2	Digital System Design: Project 2				2	3
1	2	Advanced Digital Design	2		1		4
1	2	Automotive Sensors - Infineon	2				3
1	2	Power Electronic Circuits	2		2	1	5
1	2	Advanced Analog Blocks	3		2		5
1	2	Research Activity and Practical Work S2	11				10
2	3	Advanced Analog Blocks				2	3
2	3	Advanced Electronics for Cars	2		1		4
2	3	RF IC Design	2		2		5
2	3	Management of Microelectronics Projects	2		1		3
2	3	Special Topics in Analog and Smart Power Design, Infineon	2				3
2	3	Integrating Research Project				1	2
2	3	Research Activity and Practical Work S3	12				10
2	4	Practical work, scientific Research (Master Thesis preparation)	28				30

4.2 Advanced wireless communications (taught in English)

a) Faculty of Electronics, Telecommunications and Information Technology

b) Short description and main objectives:

To provide the theoretical and applied knowledge for engineers in the field of wireless communications. They should have a vision at the system level and conduct designing procedures by highlighting different levels of a wireless system or a wireless communications network, from the physical layer to the application layer. The focus will be particularly on the physical layer, which has to get an adequate level of reliability of the communication link that ensure the required level of application quality of service (QoS) as well as mobility. Due to the special dynamics of the concerned areas, it is aimed at combining all principle aspects regarding the latest technological trends. These objectives can be achieved through:

- Increasing knowledge of the electronic and telecommunications bachelors (graduated engineers) in the field of radio communications;

- Creating conditions for exchanging both students and teachers between universities and for putting them in touch to the latest concerns in Europe and the world by developing teaching in English;

- Attracting major economic players in the industry (operators, equipment development companies, application developers, regulatory bodies and other companies interested in wireless communications and mobility access systems) in preparing students in this field.

c) Other information

Based on some informal discussions Orange and FreeScale are interested in the development of this program.

All the courses of the program are open for Erasmus incoming students.

d) Website:
http://www.electronica.pub.ro/images/continut/admitere/masterat/Prezentare_Master_A WT.pdf

e) Contact person: Mr. Ioan Marghescu, marion@comm.pub.ro

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Optimization Techniques and Random Signals in Telecommunications	2		1		4
1	1	Advanced Communication Networks, Protocols and Services	2		1		4
1	1	Advanced Digital Signal Processing Techniques	2		1		4
1	1	Mobile Communications Systems	2		1	1	4
1	1	Cryptography and Security in Communication Networks	2			1	4
1	1	Research Activity and Practical Work S1	12				10
1	2	Advanced Data Transmission Technologies	2		1		4
1	2	Access and Broadcasting Digital Radio Technologies	2		1	1	4
1	2	Software Defined Radio and Programmable Circuits Design	2		1		3
1	2	Digital Video and Multimedia Processing	2			1	3
1	2	Embedded Systems	2		1		4
1	2	Advanced Telecommunications Networks - Project				1	2
1	2	Research Activity and Practical Work S2	12				10
2	3	Advanced Procedures in Wireless Communications	2		1		4
2	3	Software for Integrated Management and Control of Networks and Services	2		1		4
2	3	Software Applications for Mobile Terminals	2		1		4
2	3	Satellite Communications	2			1	3
2	3	Fiber Optics Communications	2			1	3
2	3	Integrating Research Project				1	2
2	3	Research Activity and Practical Work S3	12				10
2	4	Practical work, scientific Research (Master Thesis preparation)	28				30

4.3   Advanced Computing in Embedded Systems (taught in English)

a)   Faculty of Electronics, Telecommunications and Information Technology

b)   Short description and main objectives:

In order to reflect the recent trends in the electronics industry, offer cutting-edge knowledge to students and support research programs, the Advanced Computing in Embedded Systems Master's Program is devoted to the following fields of study and research:

- Parallel Computing
- Distributed Computing
- Energy-Aware Computing
- Embedded Computing
- Embedded System Design

c)   Other information

Joining this program provides an opportunity to work within the CERN-Atlas project on digital design or software engineering tasks, both in embedded systems, and high-level software.

Also, our master students will meet several of our partner companies: AMIQ Consulting, Tremend, Gemini Solutions and others.

d)   Website: https://www.dcae.pub.ro/en/master/2/aces/

e)   Contact person: Mr. Radu Hobincu, radu.hobincu@upb.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Operating systems	2		3		6
1	1	Microcontrollers and embedded systems	2		2		5
1	1	Parallel computing	2		3		6
1	1	Digital system design: Project 1				2	3
1	1	Partially Supervised Scientific Research I			12		10
1	2	Reconfigurable computing	2		2		5
1	2	Software development process and testing	2		3		6
1	2	Performance analysis and optimization	2		3		6
1	2	Digital system design: Project 2				2	3
1	2	Partially Supervised Scientific Research II			12		10
2	3	Distributed and High-Performance Computing	2		2		5
2	3	Wireless Sensor Networks and the Internet of Things	2		2		5
2	3	Compilers for HW Designers	2		2		5
2	3	Functional Verification	2		2		5
2	3	Partially Supervised Scientific Research III			12		10
2	4	Practical work, scientific Research (Master Thesis preparation)			28		30

5 Field of study: Aerospace Engineering

5.1 Air transport engineering (taught in English)

a) Faculty of Aerospace Engineering

b) Short description and main objectives:

Air Transport Engineering (ATE) is a master of Aerospace Engineering program taught in English, addressed to bachelor of Aerospace Engineering graduates but not only, interested in the dynamic field of Air Transport. Duration of studies is 2 Years (4 Semesters), with 240 ECTS. The students are engaged in scientific research with an individual supervisor. At the end of each semester, a research report is presented to a scientific board. The program ends with a dissertation thesis and exam.

Air Transport Engineering was established in 2013, with the objective to be adapted to the needs of current civil aviation and aligned to the International Civil Aviation Organization – Next Generation of Aviation Professionals (ICAO NGAP) strategy. The curricula were decided by AirNav Board, a think tank consisting of high profile graduates of the Faculty of Aerospace Engineering.

The ATE program is multidisciplinary and its approach to complexity is holistic and systemic (understanding the aircraft as a system of systems and as a part of the air transport system).

c) Other information

✓ This program yearly receives incoming Erasmus + and other foreign students for one semester or one entire year.
✓ We have a very strong partnership with EUROCONTROL and other European and Romanian companies working in Air Transport Engineering and other related fields.
✓ We encourage and offer possibilities to our master students to develop master thesis with industrial partners.

d) Website: http://www.aero.pub.ro/files/ATEsyllabus120.pdf

e) Contact person: Mr. Octavian Thor PLETER, octavian.pleter@upb.ro

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Aircraft Performance	2	-	2	-	5
1	1	Automatic Flight Control Systems	2	-	2	-	5
1	1	Aerodynamics	2	-	2	-	5
1	1	Noise and Vibrations	2	-	2	-	5
1	1	Scientific Research and Internship 1	-	-	-	12	10
1	2	Computational Fluid Dynamics	2	-	2	-	5
1	2	Air Traffic Management Automation	2	-	2	-	5
1	2	Computer Networking and Data Link	2	-	2	-	5
1	2	Metal Stress and Fatigue	2	-	2	-	5
1	2	Scientific Research and Internship 2	-	-	-	12	10
2	3	Structural Design	2	-	2	-	5
2	3	Propulsion Systems	2	-	2	-	5
2	3	Advanced Safety and Human Factors Methods and Tools	2	-	2	-	5
2	3	Radio Technology	2	-	2	-	5
2	3	Scientific Research and Internship 3	-	-	-	10	10
2	4	Scientific Research, Internship and Dissertation	-	-	-	27	30
2	4	Ethics	1	-	-	-	2

6 Field of study: Transportation Engineering

6.1 Green, Smart and Integrated Transport and Logistics
(taught in English)

a)   **Faculty of Transportation (UNESCO)**

b)   **Short description and main objectives:**

The Green, Smart and Integrated Transport and Logistics (GSITL) ensures a holistic understanding of different technology options and methods, cross-disciplinary abilities, the main necessary competences to develop, analyze and manage innovative and advanced sustainable systems for transportation and logistics

The specific objective of the Master Program is to train specialists with skills and abilities to develop sustainable transport and logistics.

Learning outcomes:

- Knowledge and skills for international management of sustainable transport and logistics;
- Extensive knowledge of smart, green and integrated transport solutions as well as logistics
- Skills in software technology applied in transport, data science, planning methods, operations research, assessment and management.
- Skills in research, technology management and leadership, pre-requisite for career progression in international sustainable transport industry.
- Professional, conceptual and detailed design of optimized, innovative, efficient and sustainable transport and logistic processes.
- Developing innovative solutions and products in relation to the requirements of international organizations by ensuring a high standard of quality and sustainable development in traffic management.

Career prospects:

- Environmental protection professional
- Sustainable transport specialist
- Smart transport planner
- Pollution engineer
- Environmental Analyst
- Logistics Management
- Logistics Development Specialist
- Transport Operations Manager
- Specialist in intelligent technologies for optimizing and reducing the impact of transport

c) **Website:** http://www.unesco.chair.upb.ro

d) **Contact person:** Mr. Sorin Eugen ZAHARIA; sorin.zaharia@gmail.com

e) **Curriculum:**

Year	Sem	Subject name	Weekly number of hours				ECTS
			Lecture	Tutorial	Labwork	Project	
1	1	Data analysis and statistics	2	0	1	0	4
1	1	Economic and Financial Analysis	1	0	1	0	3
1	1	Green technologies in transport systems	2	0	0	2	4
1	1	Organizational Behaviour, HR and Intercultural management	1	0	1	0	3
1	1	E-commerce and Transport Marketing	1	0	1	0	3
1	1	Intermodal transportation	1	0	0	2	3
1	1	Scientific research 1/Practical stage 1	12				10
1	2	Sustainable Transport and Logistics Management	2	0	0	1	4
1	2	Knowledge Management and Innovation in Transport Services	1	1	0	0	3
1	2	Project management	1	0	0	2	3
1	2	Quality-security-environment in transport services	2	1	0	1	4
Optional 1		Safety management systems	1	1	0	0	3
		Optimization in air transport	1	0	0	1	3
Optional 2		Road and Rail safety	1	1	0	0	3
		Sustainable Urban Transportation and mobility	1	0	0	1	3
1	2	Scientific research 2/Practical stage 2	12				10
2	3	Regulatory policies and Transport Law	1	0	1	0	3
2	3	Strategic management in Transport	1	0	1	0	3
Optional 1		Aviation and environment	2	1	0	1	4
		Sustainable management and infrastructure of airports	2	1	0	1	4
		Air transport operations	1	1	0	0	3
		ICT in Air Transport	1	1	0	0	3
Optional 2		Transportation and Land-Use Integration	1	0	1	0	3
		Green vehicles	2	0	2	0	4
		Advanced Operations in Terminals	1	0	0	2	3
		Intelligent Transport Systems and ICT	2	0	1	0	4
2	3	Scientific research 3/Practical stage 3	12				10
2	4	Practical work, scientific Research (Master Thesis preparation)				27	28
2	4	Ethics	1				2

7 Field of study: Automatic Control and Computer Science

7.1 Artificial Intelligence (taught in English)

a) Faculty of Automatic Control and Computer Science

b) Short description and main objectives:

The M.Sc. programme in Artificial Intelligence offers to the enrolled students in-depth theoretical and practical knowledge on artificial intelligence and intelligent applications, distributed problem solving, machine learning and deep neural networks, computer vision, games and strategies, intelligent agents and their applications, social networks, search and filtering of information on the Web, data mining, innovative ways to represent and use data, natural language processing. It focuses on the design and implementation of state-of-the-art artificial intelligence systems, offering both computer science and engineering skills.

The programme offers the students, in each of the first three semesters, three compulsory courses and one elective, which can be selected from other master programmes taught in English offered by the Faculty of Automatic Control and Computers or by other programmes of the university, subject to the approval of the programme coordinator.

Pre-requisites: Knowledge of programming languages, algorithms, operating systems, data bases, computer systems architectures.

Career perspectives

With a Master's degree in artificial intelligence the graduates will be welcomed by companies working in intelligent systems, machine learning, data mining and big data, language technology, social media analytics, and many other leading edge topics of information technology.

c) Other information

10 partnerships with Romanian and multi-national ITC companies

9 Erasmus agreements with EU universities

23 incoming Erasmus students during the period 2013-2019

d) Website: : http://acs.pub.ro/en/academics/master-of-science-studies/

http://aimas.cs.pub.ro/master_ai/

e) Contact person: Mrs. Adina Magda Florea, adina.florea@cs.pub.ro

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Knowledge Representation	2		2		5
1	1	Computer Vision	2			2	5
1	1	Data Mining	2			2	5
1	1	Elective course	2		2		5
1	1	Research activities				12	10
1	2	Multi-agent Systems	2		2		5
1	2	Natural Language Processing	2			2	5
1	2	Symbolic and Statistical Learning	2			2	5
1	2	Elective course	2			2	5
1	2	Research activities				12	10
2	3	Neural Networks	2			2	5
2	3	Self-organizing Systems	2			2	5
2	3	Advanced Topics in Artificial Intelligence	2			2	5
2	3	Elective course	2			2	5
2	3	Research activities				12	10
2	4	Practical work, scientific Research (Master Thesis preparation)				28	30

7.2 Parallel and distributed computer systems (taught in English)

a) **Faculty of Automatic Control and Computer Science**

b) **Short description and main objectives:**

This MSc Program aims to train experts in parallel and distributed computer systems. Subjects include the design, development, deployment, evaluation, and analysis of modern parallel and distributed systems, and their applications. The content includes state-of-the-art topics and real-world techniques. Such techniques keep evolving as part of a very dynamic domain that experiments, validates, and promotes innovative solutions at the frontline of high-tech science and engineering.

c) **Relevance for the industry**

Parallel and distributed approaches are vital today to respond to the increasingly large number and type of applications processing high-volume, high-velocity data and simulating complex processes. Moreover, rapid technological advancements in the field of parallel and distributed systems (and related areas) have already led to cheap and widely accessible off-the-shelf solutions. A natural consequence is the increasing need for specialists in parallel and distributed computer systems. This MSc Program aims to train high-quality, deeply profiled experts who seek to pursue leading careers in the high-tech industry or in academic/industrial research centers. Prominent companies in this field include the US-headquartered Google, Amazon, Facebook, Apple, Microsoft, and IBM, and the Chinese companies Baidu, Alibaba, and Tencent, plus numerous European-based companies of smaller but still sizable scale.

d) **Requirements**

Basic (BSc-level) knowledge and practical skills related to Computer Programming, Algorithms, Operating Systems, Computer Networking, Computer Organization and Architecture.

e) **Skills acquired through this program**

Students will gain knowledge and practical skills related to Parallel and Distributed Architectures (including grid, cloud, edge, and peer-to-peer computing) as well as provable expertise in the design, development, deployment, evaluation, analysis, and modern applications of parallel and distributed systems. They will also learn about the current and emerging challenges in the field, the state-of-the-art solutions, including key aspects of performance, scalability, elasticity, fault tolerance, and security of parallel and distributed systems.

f) **Programing languages and technologies**

Java, C, C++, MPI, OpenMP, TBB, Cuda, OpenCL, MapReduce, Hadoop, Spark, Flink, Android.

g)   Research subjects (examples)

Distributed systems monitoring, data gathering, filtering, cleaning, aggregation and storage. Batch and real-time processing, predictions, and decision making, task scheduling and resource management, and performance analysis; Design of systems, architectures, mechanisms, and protocols for parallel and distributed computer systems. Design of experimental methods, procedures, and instruments for parallel and distributed computer systems. Security, anonymity, and privacy.

h)   Other information

Teaching language: English

Short track: for the second year, the students can apply to study at VU Amsterdam. The students will defend their Master thesis at both VU and UPB, and will receive diplomas from both sides.

i)   Contact person: Mr. Florin Pop, florin.pop@cs.pub.ro
j)   Website: http://acs.pub.ro/en/academics/master-of-science-studies/

k)   Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
1	1	Parallel Programming	2			2	5
1	1	Computer and Network Security	2			2	5
1	1	Introduction to Big Data	2			2	5
1	1	Elective course	2			2	5
1	1	Research activities				12	10
1	2	Distributed Systems	2			2	5
1	2	Cluster and Grid Computing	2		2		5
1	2	Distributed Algorithms	2			2	5
1	2	Elective course	2			2	5
1	2	Research activities				12	10
2	3	Advanced Topics in Computer and Network Security	2			2	5
2	3	Mobile Operating Systems (practical)	2			2	5
2	3	Dependable Systems	2			2	5
2	3	Elective course	2			2	5
2	3	Research activities				12	10
2	4	Ethics	1				2
2	4	Practical work, scientific Research (Master Thesis preparation)				27	28

7.3 Advanced Cybersecurity (taught in English)

a) **Faculty of Automatic Control and Computer Science**

b) **Short description and main objectives:**

The "Advanced Cybersecurity" (AC) master program aims at training highly qualified specialists in the field of cybersecurity. From a professional point of view, the master program develops engineering skills in identifying vulnerabilities, risks and cyber threats, as well as scientific skills in carrying out research projects in the field at European level. The master also aims to develop the professional autonomy of students and their ability to social interaction, transversal skills essential to further career development in both academia and the IT&C industry.

Electronic services are the basis of the main ICT applications offered to users via the Internet. Thus, the challenge faced by an information security / cyber security manager is not only to monitor information systems and ensure their security, but also to achieve integration into complex systems, such as critical infrastructures, which, in turn, they must be protected, thus ensuring cyber security, which becomes an integral part of national security. The AC maser program covers the main methods used for advanced data encryption, the most common tools and methods for detecting and managing cyber attacks, the fundamental principles of an organization's cyber security, seen as a stand-alone entity and as an integral part of an interconnected system. lonal, national and even regional level.

The AC master program will provision students with advanced techniques for the prevention and detection of cyber attacks, security audits and implementation of information security management systems. In this context, students have the opportunity to research specialized methods of in-depth analysis (forensics), using dedicated equipment and tools. Students in this master's program will interpret the impact of various types of attacks on integrated information systems (computers, smart devices, communications networks, etc.) by developing their own monitoring, detection and response tools or by integrating various existing applications.

A major area of research for the AC master program is the creation of applications for monitoring and detecting possible anomalies in integrated information systems. This category includes the creation of new applications that ensure security and safety up to the service level. Given the rapid evolution of online services, online access and personal user devices, the program prepares students to identify new challenges, finding the right methods and tools for solving, analyzing and improving the performance of these complex systems.

c) **Contact: Mr.** Nicolae Țăpuș, nicolae.tapus@cs.pub.ro

Mr. Răzvan Deaconescu, razvan.deaconescu@cs.pub.ro

d) **Curriculum:**

Year	Sem	Subject name	Weekly number of hours				ECTS
			Lecture	Tutorial	Labwork	Project	
1	1	Applied Cryptography	2		2		5
1	1	Security Protocols	2		2		5
1	1	Critical Infrastructure Cybersecurity	2			2	5
1	1	Security of Informational Systems	2		2		5
1	1	Research activities				12	10
1	2	Security in Cloud and Grid Computing	2		2		5
1	2	Cyber-defence and Cyber intelligence. Cyber security Techniques	2		2		5
1	2	Security of Mobile Devices	2		2		5
1	2	Privacy Enhancing Technologies	2		2		5
1	2	Research activities				12	10
2	3	Cryptographic Devices Design using FPGA	2		1	1	5
2	3	Cybersecurity Incidents Management	2			2	5
2	3	Information Security Management	2		1	1	5
2	3	Elective course	2			2	5
2	3	Research activities				12	10
2	4	Practical work, scientific Research (Master Thesis preparation)				28	30

7.4 Financial Computing (taught in English)

a) **Faculty of Automatic Control and Computer Science**
b) **Short description and main objectives:**

The Master of Science in Financial Computing program has the mission to train specialists in the field of Computer Science and Engineering which intend to build a career in the domain of Finance and Banking. The program combines in its curriculum advanced elements of Computer Science which are necessary to specialists working in Banking and Financial Technology (FinTech), as well as introductory Finance elements, and also elements of soft skills.

Graduates will be well prepared to work in corporations and in large, international teams, responsible with developing complex software solutions, especially in Finance and Banking. A hands-on approach is taken in teaching students how to get from an idea to the deployment and maintenance of a complete software solution.

Pre-requisites: Knowledge of programming languages, algorithms, basics of machine learning, data bases.

Career perspectives: With a Master's degree in Financial Computing graduates will be welcome in companies working in financial technologies, or developing software for banks and financial institutions. However, knowledge and experience gathered in designing, developing, deploying and maintaining complex software solutions can be useful in any software development company.

c) **Other information**
The Master program has been created and is being developed in partnership with DB Global Technology, Deutsche Bank's technology centre in Central and Eastern Europe.
Half of the subjects taught are taught in collaboration with specialists from DB Global Technology.
d) **Website:**http://aimas.cs.pub.ro/financial-computing/
https://www.facebook.com/FinCompACS/
e) **Contact person: Mr.** Andrei Olaru, andrei.olaru@upb.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Introduction to Financial Market Analysis	2	2			5
1	1	Data Mining for Computational Finance	2		2		5
1	1	Banking Software Design	2		2		5
1	1	Elective subject 1	2		2		5
1	1	Research activities				12	10
1	2	Banking System Software Life Cycle	2			2	5
1	2	Processes, products and services for finance and banking	2		2		5
1	2	Self-discovery and Effective communication (soft skills)	2	2			5
1	2	Elective subject 2	2		2		5
1	2	Research activities				12	10
2	3	Industry Expert Lectures in Finance	2			2	5
2	3	Applied Human Computer Interaction	2		2		5
2	3	Machine Learning and Computational Intelligence	2		2		5
2	3	Big-Data Fundamentals and Analytics	2		2		5
2	3	Research activities and preparation of Master Thesis				12	10
2	4	Ethics				1	2
2	4	Research activities and preparation of Master Thesis				27	28

7.5   Software Engineering (taught in English)

a)   Faculty of Engineering in Foreign Languages

b)   Short description and main objectives:

Some of the most difficult and challenging problems in industry and commerce are associated with software development. Software has become an increasingly important element of many products that are developed today. There has been a shift in costs from hardware development to software solutions development. This increases the need to be able to develop software products with accurate functionality, of high quality, on time and on budget.

Software Engineering, as a technological branch of Computing Science, establishes principles and engineering methods to be used in order to produce such software products. It is traditionally designed to bridge industry and research needs. This is why Software Engineering is in a privileged position on the job market.

The Master of Science Program on Software Engineering (MSE) at the Faculty of Engineering Taught in Foreign Language of the Politehnica University introduces a postgraduate degree to meet these challenges by educating software developers in advanced software engineering concepts that cover the entire development chain, from inception to delivery, from the business management perspective to technical management and development perspectives. MSE aims to produce software engineering industry leaders and key agents of change to improve practices in the field, as it evolves. The program is project and research oriented. This means that students have a large choice of projects and research themes to develop.

c)   Other information

There are numerous Erasmus exchanges at the level of the Master, possibility to develop master thesis together with industry companies.

d)   Website: http://ing.pub.ro/en/masterat-in-ingineria-programelor/

e)   Contact person: Mr. Nicolae GOGA, n.goga@rug.nl

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Advanced Concepts in Software Engineering	2		1		4
1	1	Programming Paradigms	2		1	1	4
1	1	Game and Interactive Simulation Systems	1		2		4
1	1	Formal Models in Software Engineering	1		1	1	4
1	1	Technologies for Big Data Analysis	2		1		4
1	1	Research 1	12				10
1	2	Model Driven Software Engineering	2		1		4
1	2	Distributed Software Engineering	2		1	1	4
1	2	Software Methodologies	2		1		4
1	2	Computing in the Semantic Web	2			1	4
1	2	Advanced Topics in Computer Networks	1		1	1	4
1	2	Research 2	12				10
2	3	Software Architectures	2		1	1	4
2	3	Software Project Management	2		1	1	5
2	3	Agent-Oriented Software Engineering	2		1		4
2	3	Special Topics in Software Engineering	1		1		3
2	3	Software Testing	2		1		4
2	3	Research 3	12				10
2	4	Ethics	1				2
2	4	Practical work, scientific Research (Master Thesis preparation)					28

7.6 Information Technologies Applied in Aviation (taught in English)

a)   Faculty of Automatic Control and Computer Science (UNESCO)

b)   Short description and main objectives:

This master programme strongly focuses on digitalization of air transport, ensuring cross-disciplinary knowledge and abilities in aviation and ICT, a holistic understanding of ICT options and methods applied in aviation.

Students will acquire learning outcomes for developing, analyzing and managing innovative and advanced ITC systems for air transport industry.

The master ensures knowledge and skills for challenging current and new interdisciplinary jobs in air transport, such as: Chief IoT, Data architect, Cybersecurity engineer, Environmental Analyst, Virtualization engineer, Developer, Responsible with digital data, Data Scientist, Airport UX Designer, UX Manager, UI Designer, Ergonomist Designer, CRM Responsible, Data Analyst, E-reputation Manager, SEO Consultant, Chief Data Officer, Data-Miner. For all these jobs, this master programme ensure IT learning outcomes (knowledge and skills) applied in aviation.

c)   Other information

The study program is carried out in line with UNESCO's mission to provide education for sustainable development and with new trends of air transport digitalization.

First-hand experience of different European planning and practices on ITC applied in aviation, is delivered by an international interdisciplinary group of professors and lecturers: University of Zagreb (Croatia), Ecole de Mines d'Albi (France), University of Strasbourg (France), University of Lisbon (Portugal), University of Zilina (Slovakia).

The UNESCO Department welcome the Erasmus + students and have agreement with Zagreb University (Croatia), Strasbourg University (France), Ecole Nationale Supérieure des Mines D'Albi-Carmaux (France), Univeristy of Paris Sud (France), University of Zilina (Slovakia).

The Master Programme is delivered with an important support from industry of air transport as for example: International Civil Aviation Organization (ICAO), COMOTI, National Company Bucharest Airports (CNAB), Menzies Aviation, DB Systel from Germany and Ministry of Transportation from Romania.

The students have the possibility to develop research in cooperation with professors and students from foreign countries and representatives of air transport industry.

Applicants must hold a Bachelor degree.

UPB could grants scholarships for African students.

d) **Website:** http://www.unesco.chair.upb.ro

The admission requirements for Romanian students are described at: https://upb.ro/admitere/

The admission requirements for foreign students are described at: http://international.upb.ro/

e) **Contact person:** Mr. Sorin Eugen ZAHARIA, sorin.zaharia@gmail.com

f) **Curriculum:**

Year	Sem	Subject name	Weekly number of hours				ECTS
			Lecture	Tutorial	Labwork	Project	
1	**1**	Air Transport Economics	1	1	0	0	3
1	**1**	Strategic Management in Aviation	1	0	0	1	3
1	**1**	Student Research Project	0	0	0	12	10
Optional 1		Aerodynamics and Flight Mechanics	2	1	0	0	3
		Airline Operations	2	1	0	0	4
		Airport Management and Infrastructure	2	1	0	1	4
		Air Traffic Management	1	1	0	0	3
Optional 2		Software Engineering	1	1	0	0	3
		System Engineering Development/ Ingineria sistemelor	2	2	0	0	4
		Data center arhitecture/ Arhitectura centrelor de sate	2	0	0	1	3
		Smart Data Processing/ Procesarea inteligentă a datelor	2	1	0	0	4
1	**2**	Aviation Operations Optimization Methods	2	1	0	0	3
1	**2**	Modeling Theory And Tools in Aviation	1	1	0	0	3
1	**2**	Specific Platforms and Tools for Aviation	2	1	0	1	4
1	**2**	ATM Information Network Management	1	0	0	1	3
1	**2**	Aviation Safety Management	2	0	0	1	4
1	**2**	Student Research Project	0	0	0	12	10
Optional 1		Airworthiness	1	1	0	0	3
Optional 2		Intelligent Interfaces	1	1	0	0	3
2	**3**	Data & Decision Support Management	2	1	0	0	3
2	**3**	CAD/CAM Methodology	2	1	0	1	4
2	**3**	Computer Vision	1	1	0	0	3
2	**3**	Unmanned Air Vehicles and their IT Needs	1	1	0	0	3
2	**3**	Cybersecurity Systems Management in Aviation	1	1	0	0	3
2	**3**	Reliability of Hardware and Software in Aviation	2	1	0	0	4
2	**3**	Student Research Project	0	0	0	12	10
2	**4**	Student Research Project and Dissertation Preparation	0	0	0	27	28
2	**4**	Ethics	1	0	0	0	2

7.7 Management, innovation et technologies des systèmes collaboratifs (Enseigné en Français)

a) Faculté d'Ingénierie en Langues Étrangères

b) Courte description et principaux objectifs:

L'objectif principal de ce master est de fournir aux étudiants des connaissances sur l'infrastructure d'information et de communication de l'organisation moderne, sur la transformation des affaires et de la gestion sous l'impact des technologies de l'information et de la communication et, en particulier, sur le rôle stratégique des systèmes d'information en économie.

Aujourd'hui. MITSC vise à présenter et à créer des compétences de travail avec les dernières techniques, méthodes, modèles et outils pour le développement et la réalisation de produits et services dans le contexte de l'entreprise moderne dans laquelle les activités sont assistées par ordinateur. Des compétences professionnelles seront créées pour modéliser les processus d'affaires dans un environnement virtuel et collaboratif.

Modélisation de systèmes d'information complexes, de systèmes collaboratifs et de leur mise en œuvre par le biais de systèmes informatiques.

• Gestion des processus de développement des systèmes informatiques et assurance qualité des produits et services informatiques.

• Gestion des ressources humaines, gestion financière, gestion du marketing, politiques et stratégies de gestion, gestion et sécurité de l'information.

• Gestion des produits et services informatiques conformément aux exigences du marché.

c) Autres informations

Des échanges bilatéraux des étudiants dans des le cadre du programme Erasmus et des collaborations avec des spécialistes du domaine IT.

Recherche scientifique en gestion, innovation et technologies de l'information.

d) Site web : http://ing.pub.ro/education/master/; http://dils.pub.ro/academic/master/

e) Personne de contact :

- M. George DRAGOI, dragoi.george23@gmail.com

- M. Dan Alexandru MITREA, danalexmitrea@gmail.com

f) Programme d'études:

An	Sem	Sujet	Heures par semaines				ECTS
			Cours	TD	TP	Projet	
1	1	Fouille de données et entrepôt de données	2		1	1	E
1	1	Management de la recherche et de l'innovation	2			2	E
1	1	Modélisation des systèmes et techniques d'optimisation	2		1	1	E
1	1	Systèmes embarqués	2		1	1	E
1	1	Recherche scientifique 1	14 semaines x 12 h				EC
1	2	Sécurité des communications et réseaux d'ordinateur	2		1	1	E
1	2	Interfaces Homme machine: Concepts, techniques et applications	2		1	1	E
1	2	Gestion des ressources humaines dans un environement virtuel	2			2	E
1	2	Technologies Web et développement des applications Web / Computing in the Semantic Web	2		1	1	E
1	2	Recherche scientifique 2	14 semaines x 12 h				EC
2	3	Management des systèmes informationnels	3		1	1	E
2	3	Systèmes adaptatifs et collaboratifs	2		1	1	E
2	3	Programmation génétique et réseaux de neurones	2		1	1	E
2	3	Impact environnmental et conception propre des produits / Internet des dispostifs intelligents	2			1	E
2	3	Recherche scientifique 3	14 semaines x 12 h				EC
2	4	Etique	1				EC
2	4	Recherche (élaboration de la thèse)	0	0	0	0	28

8 Field of study: Systems engineering

8.1 Complex systems (taught in English)

a) Faculty of Automatic Control and Computer Science

b) Short description and main objectives:

COMPLEX IS THE NEW SIMPLE: the rapid technological advance in all fields of engineering leads to a severe increase in the complexity of the studied corresponding systems. The control systems are embedded in everyday life, but have become large-scale, highly heterogenous and complex. The modelling and control of such systems is calling for specific design procedures and algorithms tailored to their complexity and high dimension.

This program offers practical aptitudes in the design, the analysis and the control of complex systems along the rapid development of Smart systems (such as Smart Cities, Smart Energy, Smart Transportation, etc.) throughout Europe. We consider ourselves up to date with all the current result in this field and our human resource, having results of international reputation, will get you involved in projects dealing with all the afore mentioned novel topics.

Pre-requisites: Theoretical and practical applied science engineering/economic knowledge.
At the end of the program, students will have knowledge and abilities regarding: operating with theories, concepts and scientific methods in the field of systems engineering; the aptitude of writing and reviewing scientific papers; developing algorithms for the analysis, the modelling and the simulation of complex systems; designing and implementing control algorithms for complex systems; using advanced scientific computing and information processing for big data systems, nonlinear systems and highly-dimensional systems; dealing with the scientific research of complex systems.

c) Other information Teaching language: English. The students joining this master program benefit from second year scholarships at SUPELEC and Ecole Centrale de Lille, France. The students graduate with a double degree, one from the Faculty of Automatic Control and Computer Science and another one from a foreign partner.

The program is run in collaboration with the Free University of Amsterdam and offers a double degree to master graduates.

d) Website: http://acs.pub.ro/doc/master/ro/short_description/CS-short-ro.pdf

e) Contact person: Mr. Cristian Oara, cristian.oara@acse.pub.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Introduction to Complex Systems	2			2	5
1	1	Scientific Writing	2			2	5
1	1	System of Systems Modelling and Analysis	2			2	5
1	1	Evolutionary Computing	2			2	5
1	1	Research activities				12	10
1	2	Computation for Complex Systems	2			2	5
1	2	Chaos and Fractals	2		2		5
1	2	Optimization for Big Data	2			2	5
1	2	Dimension and Complexity Reduction	2			2	5
1	2	Research activities				12	10
2	3	Complex Systems Case Studies	2			2	5
2	3	Nonlinear Control	2			2	5
2	3	Autonomous Agents	2			2	5
2	3	Control of Complex Systems	2			2	5
2	3	Research activities				12	10
2	4	Practical work, scientific Research (Master Thesis preparation)				28	30

8.2 Service engineering and management (taught in English)

a) Faculty of Automatic Control and Computer Science

b) Short description and main objectives:

The Master program "**Service Engineering and Management**" responds to the present worldwide demand of service innovation. The scale and complexity of globally dispersed *service systems* is growing rapidly and the importance of using resources efficiently, effectively and in a sustainable manner is rising, as service activities become an ever greater part of value creation in modern economies.

The Master program in **Service Engineering and Management** (SEM) is a program to educate professional engineers, i.e. graduates will be prepared to *conceive, design, implement* and *operate* (CDIO) *complex value-added engineering systems*. SEM has a strong emphasis on:

- Understanding the innovative technologies now required for service provision.

- Understanding the functional and the experience requirements of people using services.

- Management of the service CDIO lifecycle process and understand its value.

Specific competencies are provided by three complementary hands-on training modules: ICT (**Information and Communication Technologies**), PSO (**Psychology** and **Sociology**), and OMM (**Operations, Management** and **Marketing**).

c) Other information

✓ **Double degree diploma with University of Porto, Faculty of Engineering**

✓ 20 partnerships to industry/companies (IBM Romania, SC EAST ELECTRIC SRL, SC ASTI Automation SRL, SC Cloud Troopers SRL, S_IND Process Control SRL, SC SIS SA SRL, SC Retail Management Systems SRL, SC IPA SA, etc)

✓ incoming Erasmus students from Portugal, Spain, France

d) Website: http://acs.pub.ro/en/academics/master-of-science-studies/

e) Contact person: Mr. Theodor Borangiu, theodor.borangiu@cimr.pub.ro

f) Curriculum:

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Mathematical Modelling of Economic Processes	2		1		4
1	1	Data Mining and Data Warehousing	2		1		4
1	1	Architecture of Service Oriented Information Systems	2			2	4
1	1	IoT and SCADA Technologies	2		1		4
1	1	Network and Systems Security	2			1	4
1	1	Research activities				12	10
1	2	Business Process Modelling	2		2		4
1	2	Supply Chain Management and Logistics	2			2	4
1	2	Communication Management and Cognitive Psychology	2	1			4
1	2	Java Programming and Web Services	2		1		4
1	2	Accounting and Financial Management for Services	1		1		4
1	2	Research activities				12	10
2	3	Enterprise Integration and Management Architectures	2		1		4
2	3	Business Service Integration and Management	2			1	4
2	3	Knowledge Engineering and Services Ecosystem / Digital Marketing and Financial Performance of Business	2		1		4
2	3	Service Operations and Customer Relationship Management	2			2	4
2	3	Intellectual Property and Entrepreneurship	2		1		4
2	3	Research activities				12	10
2	4	Practical work, scientific Research (Master Thesis preparation)				28	30

9   Field of study: Industrial Engineering
9.1   Industrial Engineering (taught in English)

a)   Faculty of Industrial Engineering and Robotics

b)   Short description and main objectives:

The 4.0 industrial revolution or the intelligent enterprise appear as a real market need for the master study programme "Industrial Engineering". Companies as Siemens, Tenaris, Dr. Kocher, Hesper, Assa Abloy, Renault, General Turbo, Segula Technologies, Makita, Cameron a.s.o. express the need for trained staff in terms of CAD/CAM, manufacturing processes modelling & control, advanced production planning & scheduling, E-business in industrial engineering, innovation & creativity in product development & design, intellectual property, factory simulation, quality tools & performance management in the competitive global world. Additive manufacturing linked to Mechatronic & Robotics play a central role in research projects, students being involved in design, manufacturing and processes improvement. Teamwork is privileged, the students being enrolled in numerous team projects of scientific research or complex products design.

The master programme is aiming to deepen the competences acquired during the bachelor study programme Industrial Engineering, but it may be attended by graduates in different branches of Engineering, too. The programme is designed as an answer to companies' needs.

c)   Other information

The program welcomes ERASMUS students, usually the group being quite heterogeneous, supporting the multicultural dimension fostering. Teamwork is organized in order to join home and incoming students. The research activity is aimed to deepen the courses, but allowing creativity and critical thinking development. Students have the opportunity to participate to a dedicated scientific session, the best contributions being awarded and published in the faculty scientific journal Industrial Engineering, event appreciated by students and companies, too, as certain students' contributions present practical prototypes or innovative solutions.

d)   Contact person: Mrs. Irina SEVERIN, irina.severin@upb.ro

e) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Experimental Research	2	0	2	0	4
1	1	Mechanical Behaviour of Engineering Materials	2	0	0	2	6
1	1	Advanced Production Planning and Scheduling	2	0	2	0	7
1	1	Experimental Research - Project	0	0	0	2	3
1	1	Scientific research 1/Practical stage 1	12				10
1	2	Additive Manufacturing	2	0	2	0	4
1	2	Mechatronics and Robotics	2	0	2	2	6
1	2	Industry 4.0	2	0	2	2	7
1	2	Additive Manufacturing - Project	0	0	0	2	3
1	2	Scientific research 2/Practical stage 2	12				10
2	3	Factory Simulation	2	0	2	0	5
2	3	Technical Entrepreneurship for SME	2	0	2	0	4
2	3	Quality Engineering and Management	2	0	0	2	4
2	3	E-business in industrial engineering	2	0	0	2	5
2	3	Scientific research 3/Practical stage 3	11				10
2	4	Practical work, scientific Research (Master Thesis preparation)	28				30

9.2 Conception Intégrée des Systèmes Technologiques (Enseigné en Français)

a) Faculté Génie industrielle et Robotique (F.I.I.R)

b) Courte description et principaux objectifs :

L'objectif principal est de compléter les connaissances des jeunes ingénieurs et les préparer à répondre aux exigences et aux problèmes de la société moderne, tant en termes de formation professionnelle quant en termes de formation personnelle.

Conception Intégrée des Systèmes Technologiques (CIST) a été le premier master de recherche de la faculté **d'Ingénierie Industrielle et Robotique** (2003) qui prépare les ingénieurs dans la conception et la fabrication assistée par ordinateur de systèmes technologiques pour obtenir des produits compétitives, dans des conditions de qualité, de productivité, et de coût optimise , avec tout ce qui concerne ce processus (étude de faisabilité, analyse de la valeur, étude de marché, créativité, CAO-FAO etc.). Les étudiants ont à la disposition l'infrastructure du Centre National de Recherche OPTIMUM: des équipements (Machine-outil, Robots, équipements des mesure et contrôle) et des logiciels performants commeCAO-FAO. Pendant les deux années d'études, un cours de langue française techniques est également programmé.

Le master CIST promeut une méthode d'enseignement basée sur des problèmes qu'on doit résoudre et sur la pratique d'épreuves centrées sur les besoins des étudiants et aussi sur les besoins actuels de la société industrielle.

Dans le cadre de master les étudiants sont tout le temps en ligne avec les dernières demandes comme conception et application additive, Industrie 4.0. Chaque année on a des professeurs des universités françaises (ENSAM Cluny, Bordeaux 1) qui donnent des cours à ce master.

Les compétences spécialisées qu'on va avoir les étudiants à la fin des années de master sont:

1. La capacité d'appliquer des techniques d'analyse de la valeur, la faisabilité et la gestion de projet dans le développement et le management de projets industriels pour augmenter l'efficacité et optimiser les processus de production.

2. La conception innovante des produits pour la modélisation et la conception tridimensionnelle par des programmes modernes (CATIA V5, DESIGNER), de simulation et d'optimisation technico-économique des flux de production (DELMIA V5, Quest D5).

3. Conception et fabrication assistée par ordinateur des produits, en utilisant des systèmes CAO-FAO (WORKNC, EDGECAM, CATIA V5 ANSYS, ANSA, Wincam, Heidenhain etc.).

4. L'exploitation, la surveillance et l'évaluation expérimentale des systèmes technologiques.

c) Autres informations

La plupart des étudiants sont embauchés dans de prestigieuses sociétés en Roumanie avec lesquelles on a des partenariats comme: Renault Technologies, HEXAGON, Romaero SA, IMSAT, AKKA Technologies, Mazak, SEGULA, Honeywell, Oracle, Euroavia, Infinit Solutions, ainsi que dans des sociétés de l'étranger comme: SNCF, Peugeot, Virginia Tech, CHRYSLER, Jaguar Land Rover, Mitsubishi Power Systems Europe, des sociétés basées en Allemagne, au Bangladesh, à Abu-Dhabi, et autres.

Les étudiantes peuvent bénéficier des mobilités Erasmus+ pour un an et effectuer des activités dans une institution partenaire de l'Europe.Les compétences professionnelles acquises peuvent se poursuivre dans le cadre d'un doctorat.

d) Personne de contact: M. Dorel ANANIA, dorel.anania@upb.ro

e) Programme d'études: http://fiir.pub.ro/index.php/ro/masterat/planuri-de-invatamant

An	Sem	Sujet	Heures par semaines				ECTS
			Cours	TD	TP	Projet	
1	1	Systèmes intégrés de production	2	0	2	0	5
1	1	Modélisation mathématique pour l'ingénierie industrielle	2	2	0	0	5
1	1	Analyse de la valeur et analyse fonctionnelle	2	0	0	1	4
1	1	Entrepreneuriat industriel	2	1	0	0	4
1	1	Française de spécialité 1	0	2	0	0	2
1	1	Recherche scientifique et pratique	0	0	0	12	10
1	1	Total	28				30
1	2	Simulation de systèmes intégrés	2	0	0	2	5
1	2	Fabrication automatisée	2	0	1	0	4
1	2	Matériaux : modélisation des comportements et applications	2	0	2	0	5
1	2	Techniques et outils pour le développement de la créativité	2	0	1	0	4
1	2	Française de spécialité 2	0	2	0	0	2
1	2	Recherche scientifique et pratique	0	0	0	12	10
1	2	Total	28				30
2	3	Conception et fabrication intégrées	2	0	0	1	5
2	3	L'industrie 4.0 - numérisation de l'usine	2	0	2	0	5
2	3	Méthodes expérimentales pour l'évaluation des systèmes de fabrication	2	0	2	1	5
2	3	Les instruments de la qualité dans les systèmes industriels modernes	2	0	2	0	5
2	3	Recherche scientifique, pratique et élaboration de dissertation	0	0	0	12	10
2	3	Total					
2	4	Recherche (élaboration de la thèse)	0	0	0	28	30

9.3 Ingénierie des Systèmes Industriels (Enseigné en Français)

a) Faculté d'Ingénierie en Langues Étrangères

b) Courte description et principaux objectifs:

Description : Ingénieur polyvalent, l'ingénieur "Systèmes Industriels" réunit des compétences d'ingénieur et d'administrateur des fonctions techniques de l'entreprise. S'appuyant sur des connaissances et compétences dans les sciences fondamentales et sociales de l'ingénieur, il associe et coordonne les interfaces entre la maîtrise des processus industriels et le pilotage des systèmes industriels complexes et intégrés.

Objectives :

➢ Préparer des professionnels en ingénierie des systèmes industriels, avec un éventail de compétences techniques, économiques et d'organisation nécessaires pour planifier, diriger, suivre et analyser les projets et processus industriels complexes.

➢ Compléter la formation des diplômés de premier cycle de l'enseignement supérieur (trois ans ou plus) avec des connaissances en sciences techniques, économiques et sociales, pour mieux répondre aux exigences du marché du travail ;

Compétences :

➢ Connaissances en sciences techniques, économiques et sciences humaines et sociales ;
➢ Maîtrise et suivi des diverses ressources de l'entreprise (humaines, techniques et financières) ;
➢ Vision globale sur l'activité de l'ingénieur dans l'entreprise ;
➢ Capacité à intervenir sur l'ensemble d'un processus industriel ;
➢ Nombreux secteurs d'activités : ingénierie, industrialisation, production, qualité, systèmes d'informations, logistique, gestion de projet, création d'entreprise ;

c) Autres informations

➢ **Double diplôme avec l'Institut National Polytechnique de Toulouse (INPT), France ;**

➢ Le mastère *Ingénierie des Systèmes Industriels* continue, depuis 25 ans, sa collaboration avec INPT, plus de 150 étudiants (roumains et étrangers) ayant obtenu des doubles diplômes pendant ces années ;

➢ Les étudiantes peuvent bénéficier des mobilités Erasmus+ pour un an et effectuer des activités (études ou placement) dans les institutions partenaires de l'Europe.

➢ Chaque année, le mastère *Ingénierie des Systèmes Industriels* reçoit des étudiants européens, pour un ou deux semestres, par l'intermède des accords Erasmus ;

> Dans les dernières années, des nombreux étudiants provenant des pays non-UE (Maroc, Tunisie, Algérie, Cameroun), ont participés à ce master, avec des très bons résultats ;

> Les compétences professionnelles acquises peuvent se poursuivre dans le cadre d'un doctorat ;

> Les étudiants diplômés de ce master sont employés dans des entreprises prestigieuses, en Roumanie ou à l'étranger.

d) Site web : http://ing.pub.ro/admitere-master-ingineria-sistemelor-industriale/

e) Personne de contact : M. Virgil DUMBRAVA, v_dumbrava@yahoo.com

f) Programme d'études:

An	Sem	Sujet	Heures par semaines				ECTS
			Cours	TD	TP	Projet	
1	1	Méthodes d'optimisation	2		1		4
1	1	Modèles économiques	2	1			4
1	1	Analyse de la valeur et analyse fonctionnelle	2	1			4
1	1	Conception des produits industriels	2			1	4
1	1	Techniques de planification des projets	2		2		4
1	1	Recherche scientifique 1	14 semaines x 12 h				10
1	2	Analyse et suivi des projets	2	1			4
1	2	Eléments d'analyse financière	2	1			4
1	2	Eléments d'ergonomie	2		1		4
1	2	Gestion de la production	2		2		4
1	2	Conception assistée par ordinateur	2		1		4
1	2	Recherche scientifique 2	14 semaines x 12 h				10
2	3	Marketing	2		1		4
2	3	Système de management de la qualité	2		1		4
2	3	Analyse des coûts pour les projets industriels	2			2	4
2	3	Systèmes d'organisation des entreprises	2			1	4
2	3	Management des ressources humaines	2	1			4
2	3	Recherche scientifique 3	14 semaines x 12 h				10
2	4	Recherche, internship, élaboration de la thèse	0	0	0	0	28
2	4	Etique	1				2

10 Field of study: Applied Engineering Sciences
10.1 Smart Biomaterials and Applications (taught in English)

a) Faculty of Medical Engineering

b) Short description and main objectives:

The master program Smart Biomaterials and Applications is organized and coordinated by the Faculty of Medical Engineering from the University POLITEHNICA of Bucharest (UPB).

The main purpose of the program is to provide competitive education using state-of-the-art laboratories and highly skilled trainers for the tomorrow's specialists and leaders in the field of Biomaterials and Applications. This program aims the development of real employability skills according to the current requirements of employers in modern fabrication technologies, implants, tissue engineering and medical engineering.

The specific objectives of the program are:

a. Assimilation of solid technical knowledge, verbal and written communication, decision making, lateral thinking, analytical thinking, investigating, in the field of modern and smart biomaterials (advanced materials – biomimetic, smart; artificial organs; bio functionalization; surface engineering; control of properties; (bio)fabrication technologies – 3D (bio)printing, electrospinning; advanced characterization methods – micro-CT, biodynamic testing, biosensors, algorithms, concepts, modeling, simulation, optimization, etc.);

b. Knowledge and use of modern hardware tools (fabrication technologies: 3D (bio)printing, electrospinning, extrusion, plasma treatment; advanced characterization / testing including: contact angle and superficial tension, circular dichroism, micro-CT, electron microscopy, FTIR, Raman, UV-Vis spectroscopy) and corresponding software packages (for programming, modeling, design, image analysis) from the field of smart biomaterials and applications.

c) Other information

We have a strong partnership with the University of Medicine and Pharmacy Carol Davila, Bucharest and we promote partnership with different universities and research groups in Europe. We encourage the master students to develop master theses with research, industrial or clinical partners. The master students will be part of a research team to fully experience what means to be a researcher. All the courses of the program are open for Erasmus incoming students.

d) Website: https://fim.upb.ro/smart-biomaterials-and-applications-smart/

e) Contact person: Mrs. Izabela-Cristina STANCU, izabela.stancu@upb.ro

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	Research	ECTS
			Weekly number of hours					
1	1	Smart biomaterials	2	0	1	0	0	4
1	1	Smart and biomimetic biomaterials	2	0	2	0	0	4
1	1	Active nano-biostructured surfaces and interfaces engineering	2	0	2	0	0	4
1	1	Settings of biomaterials	2	0	1	0	0	4
1	1	Dental cements	2	0	1	0	0	4
1	1	Scientific Research/Practice 1	0	0	0	0	12	10
1	2	Artificial tissues and organs	2	0	1	0	0	3
1	2	Radiation interactions with nano-biomaterials and living tissue	2	0	1	0	0	4
1	2	Advanced technologies for biomaterials processing	2	0	1	0	0	4
1	2	Advanced technologies for biomaterials processing	2	0	0	0	0	3
1	2	Carbon-based polymeric biomaterials for bioengineering	2	0	1	0	0	3
1	2	Tissue regeneration engineering with stem cells	2	0	0	0	0	3
1	2	Scientific Research/Practice 2	0	0	0	0	12	10
2	3	Advanced bio ceramics	1	0	3	0	0	5
2	3	Protein engineering	1	0	2	0	0	5
2	3	(Bio)Functionalized polymers-scaffolds for regenerative and personalized medicine	2	0	1	2	0	5
2	3	Medical analyses and evaluation advanced techniques	1	0	2	0	0	5
2	3	Scientific Research/Practice 3	0	0	0	0	12	10
2	4	Research/Practice for the Dissertation	0	0	0	0	27	28
2	4	Ethics	1	0	0	0	0	2

11 Field of study:Engineering and Management

11.1 Business Administration and Engineering (taught in English)

a) **Faculty of Engineering in Foreign Languages**

b) **Short description and main objectives:**

The program runs for 24 years and produced graduates working in key positions in renowned companies, some started up as their own entrepreneurial initiatives. The program addresses the graduates from technical universities, general universities or academies of economics from Romania and abroad, wishing to obtain economic knowledge and to achieve digital proficiency fos successful businesses. The students receive a combination of technical and economical knowledge, granting analytical abilities and problem solving skills in business administration and management.

c) **Other information**

✓ This program yearly receives incoming Erasmus students for one semester or one entire year.

d) **Website:** http://ing.pub.ro/en/education/master/mbae/

e) **Contact person:** Mr. Bujor PAVALOIU, bujor.pavaloiu@upb.ro

f) Curriculum:

Year	Sem	Subject name	Weekly number of hours					ECTS
			Lecture	Tutorial	Labwork	Project	Reseaearch	
Compulsory subjects								
1	1	Industrial Marketing	2		1			4
1	1	Financial Management	2		1	1		4
1	1	Management of Information Systems	2		1			4
1	1	Event Driven Dynamic Systems	2		1			4
1	1	International Trade and Transactions	2		1			4
1	1	Scientific and Practical Research 1					12	10
Facultative subjects								
1	1	Design management of educational programs	2	1				5
			Lecture	Tutorial	Labwork	Project	Reseaearch	
Compulsory subjects								
1	2	Strategic Management	2		2			5
1	2	Numerical Methods for Economic Systems	2		1	1		5
1	2	Data and Signal Processing for Business	2		2			5
1	2	Business Cultural Models and Diversity Management	2		2			5
1	2	Scientific and Practical Research 2					12	10
Facultative subjects								
1	2	Psycho pedagogy of Adolescents, Young People and Adults	2	1				5
1	2	Multimedia Advice, Guidance and Counselling (Optional 1)	1	2				5
Compulsory subjects								
2	3	Technology Entrepreneurship	2		2			5
2	3	Project Management	2		1	1		5
2	3	Prediction of System Evolution	2		1	1		5
2	3	Modeling of Complex Systems	2		1	1		5
2	3	Scientific and Practical Research 3					12	10
Facultative subjects								
2	3	Didactics of the field and developments in the didactics of specialization (high school, post-secondary school education)	2	1				5
2	3	Sociology of Education / Intercultural Education (Optional 2)	1	2				5

		Compulsory subjects						
2	4	Research, practice research and dissertation preparation					27	28
2	4	Ethics	1					2
		Facultative subjects						
2	4	Pedagogical practice (high school, post-secondary school education)					3	5
2	4	Graduation Exam, Level II						5

11.2 Management of the digital enterprises (taught in English)

a) **Faculty of Entrepreneurship, Business Engineering and Management**

b) **Short description and main objectives:**

Master of the Digital Enterprises (*MDE*) was initiated by the Department of Entrepreneurship and Management, the Faculty of Entrepreneurship, Business Engineering and Management from the University Politehnica of Bucharest. The program is run in collaboration with the Faculty of Automatic Control and Computer Science. The program is completed in four semesters over two years and will be highly practice oriented. As a minimum requirement for admissions to the program, applicants must have a bachelor's degree and good English language skills.

Digital technology contributes decisively to remodelling the whole industry and value chains, offering a wide range of products and services, facilitating capitalizing opportunities and also optimizing the organization's response to change or reducing the barriers to entry in different industrial sectors. A digital enterprise is characterized by extensive connectivity and by the integration of processes and existing capabilities. Increasing connectivity in the business sector by using more and more equipment that automatizes business processes, providing services or processing data, determined, in many cases, enterprises to invest in smart technologies. All functions of an enterprise, regardless of industry operating in, have also a technical dimension which must be integrated within the operations and processes involved. For example, creating virtual agile enterprises that ensures continuous improvement of operations in a digital environment. Businesses digitization can significantly contribute in the future to creating jobs and generating business opportunities.

From this perspective there is a real demand on the labour market for specialists capable to understand and efficiently use these technologies, both technically, but also for business management. The program aims to prepare specialists able to understand and analyse strategies and business processes in an enterprise. Therefore, the program of master studies "Management of the Digital Enterprise" meet these requirements by preparing specialists able to recognize the opportunity to use digital technologies in enterprises but also how the way these technologies can contribute to business sustainable development.

This study program facilitates the development of business skills for students with a technical background or for those with management background that want to develop skills in using digital technology. Therefore, the program aimed at deepening the training in the field of study - *Engineering and Management*.

c) **Other information**

✓ This program yearly receives incoming Erasmus students for one semester or one entire year.

d) **Website:** http://faima.pub.ro/other_docs/Plan_Invatamant_Master_MDE_2014-2015.pdf

e) **Contact person:** Mr. Gheorghe Militaru, gheorghe.militaru@upb.ro

f) **Curriculum:**

Year	Sem	Subject name	Weekly number of hours				ECTS
			Lecture	Tutorial	Labwork	Project	
1	1	Production Systems & Group Technology	2		2		4
1	1	Batch Planning and Resources Allocation	2		1		4
1	1	Organizational Management	2		1		4
1	1	Managing Human Capital	2		1		3
1	1	Business Intelligence and Risk Management	2		1		2
1	1	Scientific Research Work S1	12				13
1	2	Integrated Supply Chains and Logistics	2		1		3
1	2	Enterprise Warehousing and Information Systems	2		1		4
1	2	Financial Management	2		1		3
1	2	Business Process Modelling	1			1	3
1	2	Project Management	1			1	2
1	2	Power Management for Sustainability	2		1		3
1	2	Scientific Research Work S2	12				12
2	3	Digital Marketing	2		1		3
2	3	Entrepreneurship	2			1	3
2	3	Service Management	2		1		3
2	3	Business Communication	2		1		3
2	3	Business Process Management	1		1		3
2	3	Customer Relationship Management	1		1		2
2	3	Scientific Research Work S3	12				13
2	4	Practical work, scientific Research (Master Thesis preparation)	28				30

11.3 Business Engineering and Entrepreneurship (taught in English)

a) Faculty of Entrepreneurship, Business Engineering and Management

b) Short description and main objectives:

The Master program "***Business Engineering and Entrepreneurship"*** (***BEE***) is organized and coordinated by the Department of Entrepreneurship and Management, the Faculty of Entrepreneurship, Business Engineering and Management from the University Politehnica of Bucharest. Entrepreneurship education is critical for engineers in the knowledge-based economy. Teaching and research on new venture creation are the most common drivers of technological entrepreneurship initiatives. Successful technology ventures are able to meet customers' needs, leverage technology for advantage, and have a viable business model.

The mission of the BEE program is to enable every student to have the opportunity to integrate entrepreneurial and business studies into their formal education. The main objective is to provide skills and abilities necessary for students to identify and evaluate business opportunities, creating ventures focused on solving challenges in society and manage their own business. Entrepreneurs must be able to identify customer needs and market niches using lateral thinking skills and these skills should be taught to engineering students. Basically, this program could increase the entrepreneurial intention and activity of the students.

The program is completed in four semesters over two years and will be highly practice oriented. Program requires students to obtain a bachelor's degree before applying and good English language skills. Therefore, this program addresses the graduates from technical universities, but not only, wishing to develop skills necessary to identify, evaluate, and begin new business ventures. Students with a non-business bachelor degree can acquire knowledge and skills in entrepreneurship by participating in our master program (BEE). This is an excellent way to broaden career possibilities for them and building a successful career in international business environment. Designed to train future specialists this program will provide a strong foundation in technology entrepreneurship, marketing, project management, financial management, business strategy, and economics for entrepreneurs. Our teachers use real-world case studies and the latest academic research to identify and investigate issues that could develop key business skills. Therefore, the program aimed at deepening the training in the field of study - *Engineering and Management*.

c) Other information

✓ All the courses of the program are open for Erasmus incoming students

d) Contact person: Mr. Gheorghe Militaru, gheorghe.militaru@upb.ro

e) **Curriculum:**

Year	Sem	Subject name	Weekly number of hours				ECTS
			Lecture	Tutorial	Labwork	Project	
1	1	Essentials of Business Management	2	1			5
1	1	Economics for Entrepreneurs	1	2			4
1	1	Human Capital Management in SMEs	2	1			4
1	1	Marketing	2	2			4
1	1	Communication & Negotiation Techniques	1	2			3
1	1	Scientific Research Work S1	12				10
1	2	Technology Entrepreneurship	2	1		1	5
1	2	Financial Management	2	1			5
1	2	Change Management	1	2			3
1	2	Operations Management	2	1			4
1	2	Services Management	2	1			3
1	2	Scientific Research Work S2	12				10
2	3	Project Management for Entrepreneurs	2	1			5
2	3	Business Strategy & Business Plan Model Development	2	1			5
2	3	Information Systems for Managers	1	2			4
2	3	Organizational Behaviour & Leadership	1	1			3
2	3	Business Risks Analysis & Management	2	1			3
2	3	Scientific Research Work S3	12				10
2	4	Practical internship, scientific Research (Master Thesis preparation)	28				30

11.4 Sustainable Business Excellency and Leadership (taught in German)

a) **Faculty of Engineering in Foreign Languages**

b) **Short description and main objectives:**

The Faculty of Engineering in Foreign Languages (FILS) established and developed the master program „ *Sustainable Business Excellency and Leadership*" together with renown Professors from Germany and Austria as well as international enterprises (Intel, Noerr, Stein & Partner Management Consulting, Linarson, Hewlett-Packard Enterprise and APT Resources etc.) with the aim of an qualifying specialists at the highest standards and requirements with international competencies for sustainable business development. The program is tailored for Engineers who intend to acquire within their career path business competencies as well as competencies related to sustainability with direct use in their working environment, without being limited to them.

c) **Other information**

- All the courses of the program are open for Erasmus incoming students and the program has incoming and outgoing Erasmus students for one or two semester each year.

- The bachelor program is carried out in cooperation with companies as Stein & Partner Management Consulting, Hewlett-Packard Enterprise und APT Resources and Services.

- The Master Thesis can be carried out in cooperation with enterprises or foreign universities.

d) **Website:** http://ing.pub.ro/wp-content/uploads/2016/09/descriere-master-ngel.pdf

e) **Contact person:** Mr. Cristian Mustață, cristianmustata@yahoo.com

f) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
			Weekly number of hours				
1	1	Soziale Kompetenzen 1	2	0	0	2	4
1	1	Nachhaltiges Personalmanagement	2	0	0	2	4
1	1	Ökologie und Umweltschutz	1	0	1	1	4
1	1	Kompetenzen im Ingenieurwesen 1/ Technikorientiertes nachhaltiges Entrepreneurship	2	0	0	2	4
1	1	Wissenschaftliche Forschung 1				12	10
1	2	Kostenmanagement	1	0	0	1	4
1	2	Online- & Social Media Marketing	2	0	0	2	4
1	2	Nachhaltiges Leadership	1	0	0	1	4
1	2	Nachhaltiges Industriegütermarketing	2	0	0	2	4
1	2	Bionik und nachhaltige Entwicklung/ Alternative Modelle nachhaltiger Entwicklung	2	0	0	2	4
1	2	Wissenschaftliche Forschung 2				12	10
2	3	Strategisches nachhaltiges Management	2	0	0	2	4
2	3	Nachhaltige Industrieinnovation und – forschung	2	0	0	0	4
2	3	Nachhaltige Geschäftsexzellenz	2	0	0	2	4
2	3	Geschäftsethik und Unternehmerische Sozialverantwortung	2	0	0	0	4
2	3	Unternehmenssimulation/ Management des virtuellen Unternehmens	2	0	2	0	4
2	3	Wissenschaftliche Forschung 3				12	10
2	4	Ethik	1			0	2
2	4	Masterthesis (Praktikum und Forschung)	0	0	0	27	28

11.5 Industrial Business Administration (taught in German)

a) Faculty of Engineering in Foreign Languages

b) Short description and main objectives:

The Faculty of Engineering in Foreign Languages (FILS) established and developed the master program „ *Industrial Business Administration* " together with renown Professors from the Technical Universities of Braunschweig, Darmstadt and Vienna as well as international enterprises (Intel, Noerr, Stein & Partner Management Consulting, Linarson, Hewlett-Packard Enterprise and APT Resources etc.) with the aim of an qualifying specialists at the highest standards and requirements with international competencies. The program is tailored for Engineers who intend to acquire within their career path business competencies with direct use in their working environment, without being limited to them.

g) Other information

- All the courses of the program are open for Erasmus incoming students and the program has incoming and outgoing Erasmus students for one or two semester each year.

- The bachelor program is carried out in cooperation with companies as Stein & Partner Management Consulting, Hewlett-Packard Enterprise und APT Resources and Services.

- The Master Thesis can be carried out in cooperation with enterprises or foreign universities.

h) Website: http://ing.pub.ro/wp-content/uploads/2015/09/descriere-master-give.pdf

i) Contact person: Mr. Cristian Mustață, cristianmustata@yahoo.com

j) **Curriculum:**

Year	Sem	Subject name	Lecture	Tutorial	Labwork	Project	ECTS
1	1	Soziale Kompetenzen 1	2	0	0	2	4
1	1	Personalmanagement	2	0	0	0	4
1	1	Datenerfassung und –verarbetung in der Logistik	2	0	1	1	4
1	1	Ökologie und Umweltschutz	1	0	1	0	4
1	1	Kompetenzen im Ingenieurwesen und Recht/ Technikorientiertes Entrepreneurship	2	0	0	2	4
1	1	Wissenschaftliche Forschung 1				12	10
1	2	Kostenmanagement	1	0	0	1	4
1	2	Analyse und Synthese der Prozesse	2	0	2	0	4
1	2	Kompetenzen im Ingenieurwesen und Management	1	0	0	3	4
1	2	Nachhaltiges Industriegütermarketing	2	0	0	2	4
1	2	Bionik/ Alternative Entwicklungsmodelle	2	0	0	0	4
1	2	Wissenschaftliche Forschung 2				12	10
2	3	Strategisches Management	2	0	0	2	4
2	3	Industrieinnovation und –forschung	2	0	0	0	4
2	3	Geschäftsexzellenz	1	0	0	3	4
2	3	Energie und Umwelt	2	0	0	0	4
2	3	Prozessmodellierung in der Industrie/ Management des virtuellen Unternehmens	2	0	2	0	4
2	3	Wissenschaftliche Forschung 3				12	10
2	4	Ethik	1			0	2
2	4	Masterthesis (Praktikum und Forschung)	0	0	0	27	28

12 Field of study: Sciences de la communication

12.1 Technologies de la langue et de la traduction automatique (Enseigné en Français)

a) **Faculté d'Ingénierie en Langues Étrangères**

b) **Courte description et principaux objectifs:**

Le Master Technologies de la langue et de la traduction automatique a été mis en place en 2008 et fonctionne depuis en partenariat avec l'Université Grenoble Alpes, de France. Il répond aux besoins actuels de développement des technologies utilisées dans le traitement de la langue (logiciels de traduction et d'analyse textuelle, algorithmes, mémoires de traduction, création de corpus) mais aussi aux besoins de formation de traducteurs spécialisés. La formation offre aux étudiants les connaissances informatiques et linguistiques, leur permettant de maîtriser tant la création et la gestion d'outils informatiques que les mécanismes de fonctionnement de la langue. Le Master Technologies de la langue et de la traduction offre une formation de pointe dans le domaine interdisciplinaire de l'ingénierie linguistique. La formation apporte aux étudiants des connaissances en matière de compréhension et de génération de textes, pour qu'ils soient à même de représenter les données linguistiques dans des formalismes opératoires et de les implémenter à l'aide de programmes.

Objectifs principaux:

➢ développement et renforcement des connaissances informatiques ; développement des connaissances linguistiques et des connaissances en langues de spécialité ; création de savoirs spécifiques dans le domaine des technologies de la langue;

➢ apporter une formation informatique renforcée, adaptée aux besoins de la traduction à travers les notions d'algo-programmation, nécessaires à l'élaboration et/ou exploitation des différents outils du domaine;

➢ fournir aux étudiants les concepts nécessaires à l'analyse de l'objet langue, leur permettant d'effectuer une analyse profonde du texte d'entrée, intégrant les composantes syntaxiques, sémantiques et pragmatiques avant de procéder au transfert dans la langue cible;

➢ assurer le perfectionnement linguistique en français et l'assimilation de stratégies et de techniques de traduction.

Points forts :

➢ l'enseignement du master est dispensé totalement en français;

➢ équipe pédagogique mixte roumano-français ;

➢ groupes multinationaux d'étudiants;

➢ des mobilités Erasmus qui fonctionnent tous les ans;

- double compétence à l'issue du master : maîtrise des langues (français, anglais, espagnol) et maîtrise des technologies en TAL;
- soutenu par l'Ambassade de France à Bucarest.

Débouchés:

- ingénieur linguiste habileté à travailler dans la conception, réalisation, exploitation et maintenance de logiciels de traitement de texte et de traduction;
- traducteur spécialisé dans différents domaines techniques et/ou scientifiques, dans le multimédia (localisation de logiciels, sous-titrage, création de sites Web multilingues, traduction de sites Web);
- terminologue, rédacteur de documents techniques en langues étrangères, rédacteur-correcteur.

c) **Autres informations:** étudiants Erasmus, partenariat avec les entreprises, possibilité de développer la thèse de fin d'études à Grenoble ou en partenariat avec l'industrie

d) **Site web:** http://ing.pub.ro/admitere-technologies-de-la-langue-et-de-la-traduction-automatique/

e) **Personne de contact:** Mme. Roxana Anca TROFIN, roxanaanca.trofin@gmail.com

f) **Programme d'études:**

Année	Semestre	Discipline	Nb. H/sem	Crédits
1	1	Bases du TAL (traitement automatique de la langue)	4	5
1	1	Logiciels pour la traduction automatique I	2	4
1	1	Théories linguistiques dans le TA	4	5
1	1	Perfectionnement linguistique en français I	2	3
1	1	Développement de compétences avancées de communication technique et scientifique en anglais	2	3
1	1	Recherche scientifique	12	10
1	2	Algo -programmation	4	5
1	2	Modélisation linguistique	2	4
1	2	Modèles sémantiques et traductologie	4	5
1	2	Langue espagnole I	2	3
1	2	Communication écrite scientifique et technique en anglais	2	3
1	2	Recherche scientifique	12	10
2	1	Méthodes avancées en TAL	4	5
2	1	Élaboration structuration de corpus	4	5
2	1	Langue espagnole II	2	3
2	1	Logiciels pour le TAL II	2	4
2	1	Perfectionnement linguistique en français II	2	3
2	1	Recherche et stage pratique	12	10
2	2	Logiciels pour le TAL III	2	4
2	2	Analyse textuelle et des corpus	4	5
2	2	Création de ressources linguistiques multilingues	2	3
2	2	Communication orale scientifique et technique en anglais	4	3
2	2	Éthique de la recherche	1	2
2	2	Méthodologie de la recherche scientifique	1	2
2	2	Recherche, Stage pratique Rédaction du mémoire	14	10