

ELECTRONIC ENGINEERING BACHELOR DEGREE

BIOENGINEERING MASTER DEGREE

**COMMUNICATION AND INFORMATION TECHNOLOGY
ENGINEERING**

**ELECTRONIC ENGINEERING IN INDUSTRY AND
INNOVATION MASTER DEGREE**

Academic year 2014_2015						
Electronic Engineering Bachelor Degree (DM 270/2004)						
N.	COURSES	SSD	ACTIVITY	cts	Y_S	hs
COURSES OF THE FIRST YEAR						
1	Chemistry	CHIM/07	B	9	1_2	81
2	Geometry	MAT/03	B	6	1_1	54
3	Introduction to computer science	ING-INF/05	B	9	1_1	81
4	Mathematical analysis I	MAT/05	B	12	1_1	108
5	Mathematical analysis II	MAT/05	B	6	1_2	54
6	Physics I	FIS/01	B	12	1_2	108
6a	Physics I (part 1)	FIS/01	B	6	1_2	54
6b	Physics I (part 2)	FIS/01	B	6	1_2	54
7	Technical physics	ING-IND/11	A/I	6	1_2	48
	English language (pass/fail certificate)		AA	3	1_1	
TOTAL CREDITS OF THE FIRST YEAR						63
COURSES OF THE SECOND YEAR						
8	Basics of automatics	ING-INF/04	A/I	6	2_2	48
9	Biomedical equipment	ING-INF/06	A/I	6	2_2	48
10	Circuit theory	ING-IND/31	C	9	2_1	72
11	Electromagnetic fields I	ING-INF/02	C	9	2_2	72
12	Electronics I	ING-INF/01	C	9	2_2	72
13	Physics II	FIS/03	B	12	2_1	96
14	Signal theory	ING-INF/03	C	9	2_1	72
TOTAL CREDITS OF THE SECOND YEAR						60
COURSES OF THE THIRD YEAR						
15	Digital communications	ING-INF/03	C	6	3_1	48
16	Electromagnetic fields II	ING-INF/02	C	6	3_1	48
17	Electronics II	ING-INF/01	C	9	3_1	72
18	Elements of electronic measurements	ING-INF/07	C	6	3_2	48
19	Photonics	ING-INF/03	C	9	3_1	72
20	STUDENT CHOICE		AA	15	3_2	
TOTAL CREDITS OF THE THIRD YEAR						51
TRAINING			AA	3	3	3
THESIS			AA	3	3	3
TOTAL CREDITS OF THE DEGREE						180

LEGEND: B basics; C fundamentals; A/I accessory; AA other; cts credits; Y_S year _ semester; hs hours; SSD academic disciplines list for italian university research and teaching (see https://www.cun.it/uploads/4079/settori_scientifico_disciplinari_english.pdf?v=)

It should be noted, finally, that:

- The course of *Physics I* is didactically divided into two parts while the exam is unique.
- The course of *Fundamentals of business and accounting for students of engineering* (from civil engineering) is equivalent (as the new name of the same course) to the former course *Economics of information systems* and *Economics applied to engineering*.
- The course of *Fundamentals of Electrical Engineering* (SSD ING-IND/31) made of 6 credits is scheduled in the second year from the year 2015/2016.
- The course of *Circuit theory* (SSD ING-IND/31) made of 9 credits will not be provided in the year 2015/2016.
- The course of *Circuit theory* (SSD ING-IND/31) made of 9 credits is scheduled again in the third year from the year 2016/2017.
- The course of *Networks for multimedia communications* (SSD ING-INF/03) will be renamed *Internet and multimedia* from the academic year 2016/2017.

Preliminary requirements of the Degree in Electronic Engineering.

In all cases, the student is asked to verify in accordance with the Professor, before choosing the course, the preliminary requirements of the course.

Academic year 2014_2015						
Bioengineering Master Degree (DM 270/2004)						
N.	COURSES	SSD	ACTIVITY	cts	Y_S	hs
CORE COURSES						
1	Biomechanics	ING-INF/06	C	9	2_1	54
2	Biomedical appliances and systems	ING-INF/06	C	9	1_2	72
3	Biomedical data and signal processing	ING-INF/06	C	9	1_2	72
4	Biomedical engineering fundamentals (<i>integrated examination</i>)	ING-INF/06	C	12	1_1	96
4a	<i>Biomedical engineering fundamentals (part 1)</i>	ING-INF/06	C	6	1_1	48
4b	<i>Biomedical engineering fundamentals (part 2)</i>	ING-INF/06	C	6	1_1	48
5	Biophysics and human physiology	BIO/09	A/I	9	1_1	66
5a	<i>Biophysics and human physiology (part 1)</i>	BIO/09	A/I	6	1_1	48
5b	<i>Biophysics and human physiology (part 2)</i>	BIO/09	A/I	3	1_1	18
6	Electromagnetic technology for bioengineering	ING-INF/02	A/I	9	2_1	54
7	Neural engineering	ING-INF/06	C	6	1_2	48
TOTAL CREDITS OF CORE COURSES				63		
Track on materials and technologies for biomedical engineering						
8-11	four courses made of 33 credits chosen among the following:					
	Advanced techniques for biomaterials characterisation	ING-IND/22	A/I	9	2_2	54
	Basics of clinical engineering	ING-IND/12	A/I	9	2_1	54
	Biomaterials (<i>integrated examination</i>)	CHIM/07	A/I	9		54
	<i>Biomaterials (part 1)</i>	CHIM/07	A/I	6	1_1	36
	<i>Biomaterials (part 2)</i>	CHIM/07	A/I	3	1_2	18
	Circuits and electrical systems	ING-IND/31	A/I	9	1_1	72
	Electrical safety	ING-IND/31	A/I	6	1_2	36
	Electromagnetic pollution	ING-INF/02	A/I	9	2_2	54
	Materials science and technology (<i>from Mechanical Engineering</i>)	ING-IND/22	A/I	9	1_1	72
	Metamaterials	ING-INF/02	A/I	9	2_2	72
	Power electronics	ING-IND/32	A/I	9	2_2	72
	Sensors and transducers	ING-INF/01	A/I	6	2_1	36
	Superconductivity with applications	FIS/03	A/I	6	2_1	36
	Thermotechnical plants (<i>from Mechanical Engineering</i>)	ING-IND/11	A/I	9	*_2	72
TOTAL CREDITS OF TRACK COURSES				33		
Track on data and systems for the bioengineering						
8-11	four courses made of 33 credits chosen among the following:					
	Antennas and propagation	ING-INF/02	A/I	9	2_2	72
	Basics of clinical engineering	ING-IND/12	A/I	9	2_1	54
	Biometric systems	ING-INF/03	A/I	9	2_1	54
	Circuits and electrical systems	ING-IND/31	A/I	9	1_1	72
	Image processing	ING-INF/01	A/I	9	2_2	90
	Information theory and coding	ING-INF/03	A/I	9	1_1	72
	Metamaterials	ING-INF/02	A/I	9	2_2	72
	Multimedia communications	ING-INF/03	A/I	6	1_2	36
	Software defined radio (<i>from 2015/2016 renamed Software cognitive radio</i>)	ING-INF/03	A/I	6	2_2	48
	Telecommunication systems and services (<i>integrated examination</i>)	ING-INF/03	A/I	12	2_1	96
	<i>Planning and management of telecommunications networks and services</i>	ING-INF/03	A/I	6	2_1	48
	<i>Mobile radio systems</i>	ING-INF/03	A/I	6	2_1	48
	Telemedicine	ING-INF/06	C	6	1_2	36
TOTAL CREDITS OF TRACK COURSES				33		

LEGEND: B basics; C fundamentals; A/I accessory; AA other; cts credits; Y_S year _ semester; hs hours; SSD academic disciplines list for italian university research and teaching (see https://www.cun.it/uploads/4079/settori_scientifico_disciplinari_english.pdf?v=)

FURTHER ACTIVITIES			
12	STUDENT CHOICE	9	* *
	Examples of courses offered:		
	any other teaching offered in both tracks		
	any other teaching offered in other master degrees		
	TRAINING	3	2
	ART.10, PARAGRAPH 5, LETTER d)*	3	
	THESIS	9	2
	TOTAL CREDITS OF FURTHER ACTIVITIES	24	
	TOTAL CREDITS OF THE MASTER DEGREE	120	

It should be noted, finally, that:

- The course of *Biophysics and human physiology* is didactically divided into two parts while the exam is unique.
 - The course of *Biomaterials* is didactically divided into two parts while the exam is unique.
 - The course of *Biomedical engineering fundamentals* is didactically divided into two parts while the exam is unique.
 - The course of *Telecommunication System and Services* is didactically divided into two parts while the exam is unique.
 - The course of *Software defined radio* (borrowed from LM_27) will be renamed *Software cognitive radio* from year 2015/2016.
 - The teaching organization will try, wherever possible, to avoid time overlapping of the courses, but does not ensure it for all possible combinations of courses chosen by the students.
- Courses from outer Teaching Councils are scheduled according to their proper rules and timing.

**Art 10, paragraph 5, letter d) of which the DM 270/2004: training activities, not covered by previous letters, aimed at improving language skills, as well as computer skills and computer systems, relational, or at least useful to get into the world of work, as well as educational activities to facilitate the career choices through direct knowledge of the field of work where the qualification can give you access, including, in particular, job training and guidance referred to in Decree of 25 March 1998, n. 142, the Ministry of Labour.*

Academic year 2014_2015						
Communication and Information Technology Engineering (DM 270/2004)						
N	COURSES	SSD	ACTIVITY	cts	Y_S	hs
CORE COURSES						
1	Antennas and propagation	ING-INF/02	C	9	2_2	72
2	Digital signal processing for telecommunications	ING-INF/03	C	9	1_1	72
3	Information theory and coding	ING-INF/03	C	9	1_1	72
4	Microwaves	ING-INF/02	C	9	1_2	72
5	Optical communications	ING-INF/03	C	9	2_1	72
6	Telecommunication systems and services (<i>integrated examination</i>)	ING-INF/03	C	12	2_1	96
6a	<i>Planning and management of telecommunications networks and services</i>	ING-INF/03	C	6	2_1	48
6b	<i>Mobile radio systems</i>	ING-INF/03	C	6	2_1	48
TOTAL CREDITS OF CORE COURSES				57		

Track on information and communication technologies						
7-11	five courses made of 39 credits (with at least 12 credits of A / I courses) among the following:					
	Biometric systems	ING-INF/03	C	9	2_1	54
	Economics and business strategy (<i>from Computer Engineering</i>)	ING-IND/35	A/I	6	1_1	54
	Electromagnetic sensing of the environment	ING-INF/02	C	6	1_1	36
	Hyperfrequency components	ING-INF/02	C	9	2_1	54
	Image processing	ING-INF/01	A/I	9	2_2	90
	Infrastructures of calculator networks (<i>from Computer Engineering</i>)	ING-INF/05	A/I	9	2_1	81
	Metamaterials	ING-INF/02	C	9	1_2	72
	Optics	FIS/03	A/I	6	1_1	48
	Programmable electronic systems	ING-INF/01	A/I	9	1_2	72
	Software defined radio (from 2015/2016 renamed <i>Software cognitive radio</i>)	ING-INF/03	C	6	2_2	48
	Telemedicine	ING-INF/06	A/I (**)	6	1_2	36
TOTAL CREDITS OF TRACK COURSES				39		

Track on services and applications of information and communication technologies						
7-11	five courses made of 39 credits (with at least 12 credits of A / I courses) among the following:					
	Biometric systems	ING-INF/03	C	9	2_1	54
	Databases I (<i>mutuato da Ingegneria Informatica</i>)	ING-INF/05	A/I	6	1_1	54
	Economics and business strategy (<i>from Computer Engineering</i>)	ING-IND/35	A/I	6	1_1	54
	Electromagnetic sensing of the environment	ING-INF/02	C	6	1_1	36
	Image processing	ING-INF/01	A/I	9	2_2	90
	Information security (<i>integrated examination</i>) (A/I for 6 credits over 12)	ING-INF/03	C A/I	12		72
	<i>Elements of cryptography</i>	MAT/03	A/I	6	1_1	36
	<i>Telecommunications security</i>	ING-INF/03	C	6	1_2	36
	Information systems on the web (<i>from Computer Engineering</i>)	ING-INF/05	A/I	6	2_2	54
	Infrastructures of calculator networks (<i>from Computer Engineering</i>)	ING-INF/05	A/I	9	2_1	81
	Metamaterials	ING-INF/02	C	9	1_2	72
	Multimedia communications	ING-INF/03	C	6	1_2	36
	Object-oriented programming (<i>from Computer Engineering</i>)	ING-INF/05	A/I	6	1_2	54
	Operational research (<i>from Civil Engineering</i>)	MAT/09	A/I	6	1_1	54
	Software defined radio (from 2015/2016 renamed <i>Software cognitive radio</i>)	ING-INF/03	C	6	2_2	48
TOTAL CREDITS OF TRACK COURSES				39		

LEGEND: B basics; C fundamentals; A/I accessory; AA other; cts credits; Y_S year _ semester; hs hours; SSD academic disciplines list for italian university research and teaching (see https://www.cun.it/uploads/4079/settori_scientifico_disciplinari_english.pdf?v=)

FURTHER ACTIVITIES						
12	STUDENT CHOICE			9	2_*	
	Examples of courses offered:					
	Digital media: tv, video and internet (<i>from Master degree Film, Television and Multimedia Production</i>)	L-ART/06	A/I	6		48
	any other courses offered in both tracks					
	any other courses offered in other master degrees					
	TRAINING			3	2	
	ART.10, PARAGRAPH 5, LETTER d)*			3		
	THESIS			9	2	
	TOTAL CREDITS OF FURTHER ACTIVITIES			24		
	TOTAL CREDITS OF THE MASTER DEGREE					120

It should be noted, finally, that:

- The course of *Information Security* is didactically divided into two while the exam is unique.
 - The course of *Telecommunication System and Services* is didactically divided into two parts while the exam is unique.
 - The course of *Software defined radio* will be renamed *Software cognitive radio* from year 2015/2016.
 - The teaching organization will try, wherever possible, to avoid time overlapping of the courses, but does not ensure it for all possible combinations of courses chosen by the students.
- Courses from outer Teaching Councils are scheduled according to their proper rules and timing.

**Art 10, paragraph 5, letter d) of which the DM 270/2004: training activities, not covered by previous letters, aimed at improving language skills, as well as computer skills and computer systems, relational, or at least useful to get into the world of work, as well as educational activities to facilitate the career choices through direct knowledge of the field of work where the qualification can give you access, including, in particular, job training and guidance referred to in Decree of 25 March 1998, n. 142, the Ministry of Labour.*

Academic year 2014_2015						
Electronic Engineering in Industry and Innovation Master Degree (DM 270/2004)						
N.	COURSES	SSD	ACTIVITY	credits	Y_S	hours
CORE COURSES						
1	Chemistry of technology	CHIM/07	A/I	6	1_1	48
2	Circuits and electrical systems	ING-IND/31	A/I	9	1_1	72
3	Microwaves	ING-INF/02	C	9	1_2	72
4	Physics of the matter + Optics (<i>integrated examination</i>)	FIS/03	A/I	15		120
4a	<i>Physics of the matter</i>	FIS/03	A/I	9	1_2	72
4b	<i>Optics</i>	FIS/03	A/I	6	1_1	48
5	Power electronics	ING-IND/32	A/I	9	1_2	72
6	Programmable electronic systems	ING-INF/01	C	9	1_2	72
7	Theory of measurement and metrology	ING-INF/07	C	9	1_1	72
TOTAL CREDITS OF CORE COURSES				66		

Track on electronic devices and systems						
8-11	four courses made of 30 credits (with at least 18 credits of C courses) chosen among the following:		C			
	Advanced optoelectronics	ING-INF/01	C	6	2_2	36
	Antennas and propagation	ING-INF/02	C	9	2_2	72
	Circuit-component optimisation (from 2015/2016 will be substituted by <i>Optimization of circuits and scientific calculus</i> made of 6 credits)	ING-IND/31	A/I	9	2_2	54
	Electromagnetic sensing of the environment	ING-INF/02	C	6	1_1	36
	Electronics of solid state devices	ING-INF/01	C	9	2_1	72
	Fundamentals of photovoltaic	ING-INF/01	C	6	2_2	48
	Hyperfrequency components	ING-INF/02	C	9	2_1	54
	Image processing	ING-INF/01	C	9	2_2	90
	Metamaterials	ING-INF/02	C	9	2_2	72
	Nanoelectronics	ING-INF/01	C	6	2_2	48
	Non-linear circuits (from 2015/2016 will consist of 6 credits)	ING-IND/31	A/I	9	2_2	54
	Optoelectronics	ING-INF/01	C	9	2_2	64
	Sensors and transducers	ING-INF/01	C	6	2_1	36
	Superconductivity with applications	FIS/03	A/I	6	2_1	36
TOTAL CREDITS OF TRACK COURSES				30		

Track on electrical and electronic systems						
8-11	four courses made of 30 credits (with at least 18 credits of C courses) chosen among the following:		C			
	Antennas and propagation	ING-INF/02	C	9	2_2	72
	Circuit-component optimisation (from 2015/2016 will be substituted by <i>Optimization of circuits and scientific calculus</i> made of 6 credits)	ING-IND/31	A/I	9	2_2	54
	Electrical energetics (<i>from Mechanical Engineering</i>)	ING-IND/32	A/I	6	2_2	48
	Electrical safety	ING-IND/31	A/I	6	1_2	36
	Electromagnetic sensing of the environment	ING-INF/02	C	6	1_1	36
	Electronics of solid state devices	ING-INF/01	C	9	2_1	72
	Fundamentals of photovoltaic	ING-INF/01	C	6	2_2	48
	Hyperfrequency components	ING-INF/02	C	9	2_1	54
	Metamaterials	ING-INF/02	C	9	2_2	72
	Non-linear circuits (from 2015/2016 will consist of 6 credits)	ING-IND/31	A/I	9	2_2	54
	Optoelectronics	ING-INF/01	C	9	2_2	64
	Static power convertors design	ING-IND/32	A/I	9	2_2	54
	Superconductivity with applications	FIS/03	A/I	6	2_1	36
TOTAL CREDITS OF TRACK COURSES				30		

LEGEND: B basics; C fundamentals; A/I accessory; AA other; cts credits; Y_S year _ semester; hs hours; SSD academic disciplines list for italian university research and teaching (see https://www.cun.it/uploads/4079/settori_scientifico_disciplinari_english.pdf?v=)

FURTHER ACTIVITIES						
12	STUDENT CHOICE			9	2_*	
	Examples of courses offered:					
	any other course offered in both tracks					
	any other course offered in other master degrees					
	Biomedical appliances and systems (<i>from LM_21</i>)	ING-INF/06	A/I	9	*_2	72
	Machines and electric operations (<i>from Mechanical Engineering</i>)	ING-IND/32	A/I	9	*_1	72
	Smart grid and power quality (<i>from Mechanical Engineering</i>)	ING-IND/32	A/I	9	*_2	72
	Electric propulsion (<i>from Mechanical Engineering</i>)	ING-IND/32	A/I	9	*_2	72
	Information theory and coding (<i>from LM_27</i>)	ING-INF/03	A/I	9	*_1	72
	TRAINING			3	2	
	ART.10, PARAGRAPH 5, LETTER d)*			3		
	THESIS			9	2	
	TOTAL CREDITS OF FURTHER ACTIVITIES			24		
	TOTAL CREDITS OF THE MASTER DEGREE					120

It should be noted, finally, that:

- The course of *Matter Physics + Optics* is didactically divided into two parts while the exam is unique.
 - The course of *Optimization of circuits and components* (SSD ING-IND/31) made of 9 credits will be not more provided from year 2015/2016, while the course of *Optimization of circuits and scientific calculus* (SSD ING-IND/31) made of 6 credits will be provided instead.
 - The course of *Non Linear Circuits* (SSD ING-IND/31) changes from 9 credits to 6 credits from year 2015/2016.
 - The teaching organization will try, wherever possible, to avoid time overlapping of the courses, but does not ensure it for all possible combinations of courses chosen by the students.
- Courses from outer Teaching Councils are scheduled according to their proper rules and timing.

**Art 10, paragraph 5, letter d) of which the DM 270/2004: training activities, not covered by previous letters, aimed at improving language skills, as well as computer skills and computer systems, relational, or at least useful to get into the world of work, as well as educational activities to facilitate the career choices through direct knowledge of the field of work where the qualification can give you access, including, in particular, job training and guidance referred to in Decree of 25 March 1998, n. 142, the Ministry of Labour.*