NATIONAL TECHNICAL UNIVERSITY OF ATHENS

School of Electrical and Computer Engineering

Undergraduate Curriculum 2020-2021

(School's General Assembly 09.06.2020)

CORE COURSES

1st SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
9.2.3132.1	Linear Algebra	4	0	5
3.5.3353.1	Logic Design of Digital Systems	4	0	5
9.2.3131.1	Mathematical Analysis I (Functions of one variable)	5	0	6
3.4.3020.1	Computer Programming	3	2	6
9.4.3049.1	Physics I (Mechanics)	5	0	6
Mandatory courses by selection*				
9.1.3027.1	History of Scientific and Philosophical Ideas	2	0	2
9.1.3028.1	Sociology of Science and Technology	2	0	2
9.1.3048.1	Philosophy	2	0	2
Mandatory courses by selection†				
0.3037.1	English language	2	0	2
0.3038.1	French language	2	0	2
Electives				
0.3277.1	Historic Musicology and Theory of Music	2	0	2

Total: 6 courses

*Choose one course
†Choose one course until the 4th semester

2nd SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
3.2.3185.2	Linear Circuits Analysis	5	0	5
9.2.3374.2	Differential Equations	6	0	6
3.2.3375.2	Structure and Electrical Properties of Materials	3	1	5
9.2.3137.2	Mathematical Analysis II (Functions of several variables and Vector analysis)	5	0	6
3.4.3138.2	Programming Techniques	3	2	5
Mandatory courses by selection*				
9.3.3083.2	Mechanics (Kinematics and Dynamics of Rigid Bodies)	3	0	3
9.3.3376.2	Engineering Mechanics	3	0	3
Mandatory courses by selection†				
0.3039.2	English language	2	0	2
0.3088.2	French language	2	0	2

Total: 6 courses

3rd SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
3.5.3386.3	Introductory Lab of Electronics and Telecommunications	2	2	5
3.7.3387.3	Electric Measurements	3	2	6
3.4.3355.3	Foundations of Computer Science	4	0	5
9.2.3282.3	Probability Theory and Statistics	5	0	6
3.3.3173.3	Signals and Systems	4	0	5
Mandatory courses by selection*				
3.7.3371.3	Organization and Management	3	0	3
9.1.3079.3	Political Economy	3	0	3
Mandatory courses by selection†				
0.3089.3	English language	2	0	2
0.3090.3	French language	2	0	2

Total: 6 courses

4th SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
3.5.3012.4	Communication Networks	4	0	5
3.1.3340.4	Electromagnetic Fields I	4	0	5
3.5.3069.4	Electronics I	4	0	5
9.4.3102.4	Physics III (Wave and Quantum Physics)	4	1	6
3.5.3286.4	Stochastic Systems and Communications	4	0	5
Mandatory courses by selection*				
3.6.3243.4	Reliability and Quality Control of Engineering Systems	4	0	4
9.2.3008.4	Numerical Analysis	4	0	4
3.4.3209.4	Discrete Mathematics	4	0	4
9.2.3390.4	Complex Analysis	4	0	4
Mandatory courses by selection†				
0.3040.4	English language	2	0	2
0.3041.4	French language	2	0	2

Total: 7 courses

5th SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
3.4.3357.5	Computer Architecture	4	0	5
3.6.3388.5	Industrial Electronics	2	2	5
3.6.3285.5	Introduction to Electric Energy Systems	4	1	5
3.2.3389.5	Introduction to Telecommunications	3	1	5
3.3.3177.5	Introduction to Automatic Control	4	0	5
3.1.3342.5	Electromagnetic Fields II	4	0	5

Total: 6 courses

6th SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
3.3.3068.6	Network and Circuit Theory	4	0	5

7th SEMESTER

Code	Course	Teaching hours		
		Lectures	Lab	Credits
Mandatory				
3.7.3035.7	Electrical Design	2	2	5

FLOW PROGRAM

FLOW Y: COMPUTER SYSTEMS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.5.3236.6	Digital Systems Laboratory	1	2	4
3.4.3136.6	**Operating Systems**	2	2	6
3.4.3046.6	**Microprocessor Systems**	4	0	6
7th Semester				
3.4.3362.7	**Human-Computer Interaction**	2	2	6
3.4.3237.7	Operating Systems Laboratory	0	3	4
3.4.3213.7	**Microprocessors Laboratory**	1	3	6
3.5.3297.7	Multimedia Technology	1	2	4
8th Semester				
3.4.3207.8	Computer System Performance	3	0	4
3.4.3352.8	**Advanced Topics in Computer Architecture**	3	1	6
3.4.3330.8	Image and Video Analysis and Technology	2	2	4
3.4.3328.8	Digital VLSI Systems	2	2	4
9th Semester				
3.4.3377.9	Distributed Systems	2	1	4
3.4.3319.9	Neural Networks and Intelligent Systems	2	2	4
3.4.3257.9	Parallel Processing Systems	1	2	4
3.4.3361.9	Embedded System Design	2	1	4
	Total: 15 courses			

Mandatory courses
Full Flow = 3.4.3136.6, 3.4.3046.6, 3.43352.8 and 3.4.3213.7 or 3.4.3362.7
Half Flow = 3.4.3136.6, 3.4.3046.6, 3.4.3352.8

FLOW L: COMPUTER SOFTWARE

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.4.3123.6	**Databases**	3	1	6
3.4.3061.6	**Programming Languages I**	3	1	6
3.4.3165.6	Computer Graphics	2	2	4
7th Semester				
3.4.3105.7	**Algorithms and Complexity**	4	1	6
3.4.3287.7	Artificial Intelligence	3	1	4
3.4.3205.7	**Software Engineering**	2	2	6
8th Semester				
3.5.3337.8	Internet Programming	2	2	4
3.4.3186.8	Compilers	2	2	4
3.4.3135.8	Advanced Algorithms	3	0	4
3.4.3183.8	Knowledge Systems and Technologies	3	0	4
3.4.3399.8	Software as a Service	2	2	4
3.4.3254.8	Computability and Complexity	3	0	4
9th Semester				
3.4.3321.9	Analysis and Design of Information Systems	3	0	4
3.4.3320.9	Programming Languages II	3	0	4
3.4.3327.9	Computational Cryptography	3	1	4
3.4.3189.9	Advanced Topics in Database Systems	3	0	4
	Total: 16 courses			

Mandatory courses
Full Flow = 3.4.3061.6, 3.4.3123.6, 3.4.3105.7, 3.4.3205.7
Half Flow = 3.4.3061.6, 3.4.3123.6, 3.4.3105.7

FLOW H: ELECTRONICS, CIRCUITS, MATERIALS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.1.3288.6	Semiconductor Devices	2	1	4
3.5.3222.6	**Electronics II**	3	1	6
7th Semester				
3.5.3256.7	**Introduction to VLSI Systems Design**	2	2	6
3.5.3016.7	**Electronics III**	3	1	6
3.5.3203.7	Microelectronics: Fabrication of Integrated Circuits	2	1	4
3.3.3181.7	Linear Circuit Design	3	0	4
8th Semester				
3.5.3310.8	**Design of Analog Electronic systems**	1	3	6
3.5.3258.8	Design of Analog Microelectronic Circuits	3	1	4
3.5.3345.8	Sensors and Microsystems Technology	2	2	4
3.1.3311.8	Advanced-Technology Materials and Devices	3	0	4
9th Semester				
9.4.3378.9	Microsystems and Nanotechnology *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	2	2	4
3.5.3322.9	Electronic Packaging Techniques	2	2	4
3.2.3275.9	Telecommunication Electronics	2	1	4
3.2.3077.9	Physics, Technology and Applications of Photovoltaics	3	1	4
	Total: 14 courses			

Mandatory courses
Full Flow = 3.5.3222.6, 3.5.3016.7, 3.5.3256.7, 3.5.3310.8
Half Flow = 3.5.3222.6, 3.5.3016.7, 3.5.3310.8

FLOW D: TELECOMMUNICATION SYSTEMS AND COMPUTER NETWORKS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.5.3248.6	**Queuing Systems**	3	1	6
3.5.3299.6	**Digital Communications I**	2	2	6
7th Semester				
3.5.3298.7	**Computer Networks**	2	2	6
3.5.3060.7	IP Telephony	3	1	4
3.5.3393.7	Digital Communications II	3	1	4
8th Semester				
3.5.3370.8	Computer Network Security	2	1	4
3.5.3312.8	Mobile and Personal Communication Networks	3	0	4
3.5.3346.8	**Internet Applications**	2	2	6
3.5.3329.8	Multimedia Communications	2	1	4
3.5.3278.8	Telecommunication Systems Simulation	0	3	4
9th Semester				
3.5.3379.9	Social Network Analysis	2	1	4
3.5.3323.9	Broadband Networks	3	0	4
3.5.3251.9	Network Management – Intelligent Networks	3	1	4
3.5.3125.9	Information Theory	3	0	4
3.5.3367.9	Optical Communication Networks	3	0	4
	Total: 15 courses			

Mandatory courses
Full Flow = 3.5.3393.6, 3.5.3248.6, 3.53298.7, 3.5.3346.8
Half Flow = 3.5.3248.6, 3.5.3298.7, 3.5.3346.8 for Computer Science major
Half Flow = 3.5.3393.6, 3.5.3298.7, 3.5.3346.8 for other majors

FLOW T: ELECTROMAGNETIC WAVES AND TELECOMMUNICATION

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.1.3296.6	Applied and Computational Electromagnetics	4	0	4
3.2.3057.6	**Microwaves**	3	2	6
3.1.3356.6	Optical Science and Engineering	3	0	4
3.2.3338.6	**Modulation and Transmission Systems**	4	0	6
7th Semester				
3.1.3303.7	Propagation of Electromagnetic Waves in Plasmas	4	0	4
3.1.3301.7	Special Topics in Electromagnetics	3	0	4
3.2.3300.7	**Antennas**	3	2	6
3.2.3347.7	Computational Techniques for Information Transmission Systems	2	1	4
3.2.3335.7	Photonic Technology in Telecommunications	3	0	4
8th Semester				
3.2.3058.8	**Wireless Links and Electromagnetic Wave Propagation**	3	2	6
3.2.3360.8	Electromagnetic Compatibility	3	0	4
3.2.3366.8	Fiber-optic Transmission Systems and Networks	2	1	4
3.2.3156.8	Fiber-optic Telecommunications	3	0	4
9th Semester				
3.2.3195.9	Satellite Communications	3	0	4
3.2.3324.9	Mobile Communication Systems	3	0	4
3.2.3169.9	Radar Systems and Remote Sensing	3	0	4
	Total: 16 courses			

Mandatory courses
Full Flow = 3.2.3338.6, 3.2.3057.6, 3.3300.7, 3.2.3058.8
Half Flow = choice of three: 3.2.3338.6, 3.2.3057.6, 3.2.3300.7, 3.2.3058.8

FLOW S: SIGNALS, AUTOMATIC CONTROL AND ROBOTICS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.3.3171.6	**Control Systems Design**	4	1	6
3.3.3149.6	**Digital Signal Processing**	3	1	6
7th Semester				
3.3.3372.7	Speech and Natural Language Processing	4	0	4
3.3.3304.7	**Advanced Methods for Control Systems**	3	2	6
3.3.3305.7	**Robotics I: Analysis - Control - Laboratory**	3	2	6
8th Semester				
3.3.3333.8	**Computer Vision**	3	1	6
3.3.3176.8	Nonlinear Control systems and Applications	3	0	4
3.7.3219.8	Multidimensional Systems	3	0	4
3.3.3348.8	Robotics II: Intelligent Robotic Systems	3	1	4
3.3.3175.8	Optimization Techniques and Control Applications	4	0	4
9th Semester				
3.3.3208.9	Pattern Recognition	3	1	4
3.3.3179.9	Optimal Control and Applications	3	0	4
3.3.3279.9	Neuro-Fuzzy Control and Applications	3	0	4
3.3.3172.9	Stochastic Control	3	0	4
	Total: 14 courses			

Mandatory courses
Full Flow= 3.3.3171.6, 3.3.3149.6, 3.3.3305.7 and 3.3.3304.7 or 3.3.3333.8
Half Flow= 3.3.3171.6, 3.3.3149.6, 3.3.3305.7

FLOW Z: ENERGY CONVERSION, HIGH VOLTAGES AND INDUSTRY APPLICATIONS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.6.3290.6	**Electric Machines I**	3	2	6
3.6.3127.6	**Power Electronics I**	3	2	6
3.6.3103.6	Lighting Technology	2	2	4
7th Semester				
3.6.3307.7	**Electric Machines II**	3	2	6
3.2.3344.7	Electrical Insulating Materials	2	1	4
3.6.3261.7	Power Electronics II	3	2	4
3.6.3101.7	**High Voltage Generation**	4	1	6
8th Semester				
3.7.3164.8	Electromechanical Installations in Industry and Buildings	4	0	4
3.7.3215.8	Electromagnetic Propulsion and Levitation	2	1	4
3.6.3216.8	Transient Performance of Electric Machines	2	1	4
3.6.3047.8	**High Voltage Measurements and Applications**	4	1	6
3.7.3252.8	Control of Electric Drives	2	2	4
9th Semester				
3.6.3128.9	Design and Construction of Electric Machines	2	1	4
3.7.3354.9	Quality Control of Industrial Installations' Equipment and Materials	2	1	4
3.6.3202.9	Protection of Electrical Installations Against Overvoltages	3	0	4
3.7.3339.9	Special Electric Motors	2	2	4
	Total: 16 courses			

Mandatory courses
Full Flow = 3.6.3290.6, 3.6.3127.6, 3.6.3101.7 and 3.6.3307.7 or 3.6.3047.8
Half Flow = 3.6.3290.6, 3.6.3101.7, 3.6.3127.6

FLOW E: ELECTRIC POWER SYSTEMS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.6.3380.6	Applied Thermodynamics of Pure Substances *(Co-taught with the School of Mechanical Engineering)*	4	0	4
3.6.3074.6	**Economic Analysis of Power Systems**	4	0	6
3.6.3246.6	**Electric Power Generation**	4	0	6
7th Semester				
3.6.3308.7	**Power System Analysis (Steady State)**	3	1	6
3.6.3349.7	Flexible AC Transmission Systems	3	0	4
8th Semester				
3.6.3313.8	**Power System Analysis (Asymmetrical and Transient State)**	3	1	6
3.6.3214.8	Electricity Distribution Networks	3	1	4
3.6.3182.8	Energy Economics	3	0	4
3.6.3363.8	Supervision and Management of Energy Systems	2	2	4
3.6.3314.8	Energy Control Centers	3	1	4
9th Semester				
3.6.3244.9	Renewable Energy Sources	4	0	4
3.6.3235.9	Reliability Analysis of Power Systems	3	1	4
3.6.3227.9	Power System Control and Stability	2	1	4
3.7.3325.9	Energy Management and Environmental Policy	2	2	4
3.6.3224.9	Power System Protection	3	1	4
	Total: 15 courses			

Mandatory courses
Full Flow = 3.6.3074.6, 3.6.3246.6, 3.6.3308.7, 3.6.3313.8
Half Flow = 3.6.3074.6, 3.6.3246.6, 3.6.3308.7

FLOW O: MANAGEMENT AND DECISION SUPPORT SYSTEMS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.6.3292.6	**Business Microeconomics**	3	1	6
3.7.3196.6	**Management and Management Information Systems**	3	1	6
7th Semester				
3.7.3341.7	Production and Operations Management	3	0	4
3.6.3269.7	Mathematical Programming Models	4	0	4
3.7.3306.7	**Decision Support Systems**	3	1	6
8th Semester				
3.7.3365.8	Management of the Digital Enterprise	2	1	4
3.7.3381.8	Multiple Criteria Decision Making	3	0	4
3.7.3264.8	Financial Management Systems	2	1	4
3.7.3260.8	**Forecasting Techniques**	4	0	6
9th Semester				
3.7.3334.9	**Management Game**	0	4	6
3.7.3255.9	Project Management	2	2	4
	Total: 11 courses			

Mandatory courses
Full Flow = choice of four: 3.6.3292.6, 3.7.3196.6, 3.7.3306.7, 3.7.3260.8, 3.7.3334.9
Half Flow = choice of three: 3.6.3292.6, 3.7.3196.6, 3.7.3306.7, 3.7.3260.8

FLOW I: BIOENGINEERING

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
3.1.3259.6	**Introduction to Biophotonics and Cellular Engineering**	2	2	6
3.2.3392.6	**Introduction to Biomedical Engineering**	3	1	6
3.2.3336.6	**Biomedical Technology Laboratory**	1	3	6
7th Semester				
3.1.3267.7	Principles of Biomedical Instrumentation	3	0	4
3.2.3331.7	Biomedical Signal Analysis and Processing	3	0	4
3.1.3350.7	**Measurement and Control in Biomedical Engineering**	1	3	6
8th Semester				
3.2.3272.8	Medical Imaging and Image Processing	3	0	4
3.2.3382.8	m-health and e-health Technologies	3	0	4
9th Semester				
3.7.3245.9	Installation, Administration and Quality Control of Medical and Hospital Systems	4	0	4
3.2.3326.9	**Physiological Systems Modeling, Simulation and Control**	2	2	6
	Total: 10 courses			

Mandatory courses
Full Flow = 3.1.3259.6 or 3.2.3392.6 and 3.2.3336.6, 3.1.3350.7, 3.2.3326.9
Half Flow = 3.1.3259.6 or 3.2.3392.6 and 3.2.3336.6, 3.1.3350.7

FLOW F: PHYSICS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
9.4.3158.6	Condensed Matter Physics *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.4.3121.6	Physics and Technology of Lasers *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	3	1	4
7th Semester				
9.4.3078.7	Quantum Mechanics II *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.4.3302.7	Optoelectronics *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	2	2	4
9.3.3398.7	Complex Hamiltonian Dynamics and Applications *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	3	0	4
9.4.3051.7	Nuclear Physics and Elementary Particles	2	2	4
8th Semester				
3.1.3364.8	Physics and Technology of the Controlled Thermonuclear Fusion	3	1	4
9th Semester				
9.4.3234.9	New Technological Materials *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	3	1	4
9.4.3395.9	Multi-Body Physics and Quantum Computers *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
	Total: 9 courses			

FLOW M: MATHEMATICS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
9.2.3396.6	Matrix Analysis and Applications *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.2.3293.6	Numerical Methods for Differential Equations *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
3.4.3229.6	Mathematical Logic *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.2.3373.6	Stochastic Procedures *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
7th Semester				
9.2.3384.7	Algebra and Applications *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.2.3397.7	Measure Theory and Applications *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
8th Semester				
9.2.3317.8	Applications of Logic in Computer Science *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.2.3167.8	Applied Mathematics - Calculus of Variations *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.2.3383.8	Number Theory *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
9.2.3294.8	Graph Theory *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	4	0	4
	Total: 10 courses			

MISCELLANEOUS

Code	Course	Teaching hours		
		Lectures	Lab	Credits
6th Semester				
9.4.3318.6	Ionizing Radiation Physics and Applications in Medicine and Biology *(Co-taught with the School of Applied Mathematical and Physical Sciences)*	3	1	4
2.1.3161.6	Technological Economics *(Co-taught with the School of Mechanical Engineering)*	4	0	4
8th Semester				
3.6.3358.8	Environment and Development	3	0	4
3.7.3394.8	Internship			6
9th Semester				
9.1.3062.9	Elements of Law and Technical Legislation *(Co-taught with the School of Mechanical Engineering)*	4	0	4
	Total: 5 courses			

Only one course may be selected, excluding 3.7.3394.8

HUMANITIES

Code	Course	Teaching hours		
		Lectures	**Lab**	**Credits**
8th Semester				
4.1.3385.8	Αστική Κοινωνιολογία *(Co-taught with the School of Architecture)*	3	0	2
9.1.3146.8	Special Topics in Sociology	2	0	2
9.1.3147.8	Special Topics in Philosophy	2	0	2
9.1.3368.8	Information Technologies and Society	2	0	2
	Total: 4 courses			

Only one course may be selected