

Course Descriptions

Electrical and Computer Engineering at AUG

Course Name	Mathematical Way of Thinking
Course No	MATH105001
ECTS Credits	5
Language	Georgian
Lecturer	Levan Sigua l.sigua@agruni.edu.ge Konstantine Dardjania k.darjania@agruni.edu.ge Nugzar Iosebashvili n.iosebashvili@agruni.edu.ge Tengiz Kobakhidze t.kobakhidze@agruni.edu.ge
Prerequisites	None
Description	Dirichlet's principle; Mathematical induction; Prime numbers; Arithmetic and Geometric Progression; Complex numbers; Combinatorics; Set theory; Probability theory; Statistics; Logic; Graph.

Course Name	Mathematics I (<i>for Engineers</i>)
Course No	MATH106007
ECTS Credits	6
Language	Georgian
Lecturer	Levan Sigua l.sigua@agruni.edu.ge Konstantine Dardjania k.darjania@agruni.edu.ge
Prerequisites	Mathematical Way of Thinking
Description	Set; Matrices; Rules for Matrix Operations; The Properties of Determinants; Permutations and Cofactors; Cramer's Rule, Inverses, and Volumes; The Rank and the Row Reduced Form; Vectors and Coordinate Geometry in 3-Space; Analytic Geometry in Three Dimensions; Hanging Cables and Chains; The Dot Product and Projections; Vector in n-Space; The Cross Product in 3-Space; The Cross Product as a Determinant; Planes and Lines in 3-Space; Quadric Surfaces; Conics, Parametric Curves and polar Curves; Parabolas; The Focal Property of Parabola; Ellipses; The Focal Property of an Ellipse; The Directrices of an Ellipse; Hyperbolas; The Focal Property of Hyperbola; Classifying General Conics; Sequences and Convergence; Limits of Functions; Limits at Infinity and Infinite Limits; Continuity of a Function at a Point and Interval; Finding Maxima and Minima Graphically; The Formal Definition of limit.

Course Name	Mathematics II (<i>for Engineers</i>)
Course No	MATH205005
ECTS Credits	5
Language	Georgian
Lecturer	Levan Sigua l.sigua@agruni.edu.ge Konstantine Dardjania k.darjania@agruni.edu.ge
Prerequisites	Mathematics I (for Engineers)
Description	Tangent Lines and their Slopes; The Derivative; Differentiation Rules; The Chain Rule; The Mean-Value Theorem; Extreme Values; Concavity and Inflections; Functions of Several Variables; Limits and Continuity; Partial Derivatives; Higher-Order Derivatives; Sums and Sigma Notation; Areas as Limits of Sums; The Method of Substitution; Integration by Parts; The Definite Integral; Properties of the Definite Integral; Improper Integrals; First-Order Differential Equations; Second-Order Linear Differential Equations with Constant Coefficients; Sequences, Series and Power Series; Fourier Series; Periodic Functions; Taylor and Maclaurin Series.

Course Name	Mathematics III (<i>for Engineers</i>)
Course No	MATH206006
ECTS Credits	6
Language	Georgian
Lecturer	Levan Sigua l.sigua@agruni.edu.ge Konstantine Dardjania k.darjania@agruni.edu.ge
Prerequisites	Mathematics II (for Engineers)
Description	Error Analysis; Representations of Numbers; Roundoff Errors and Floating-Point Arithmetic, Error Propagation; Interval Arithmetic; Interpolation by Polynomials; The Interpolation Formula of Lagrange; Neville's Algorithm; Newton's Interpolation Formula; The Error on Polynomial Interpolation; The Integration Formulas of Newton and Cotes; Peano's Error Representation; Systems of Linear Equations; Linear Equations Iterative Methods; Linear equations subtraction method; differential equations difference method; Initial value problem; Basic Probability Concepts; Events and Sample Spaces; Contingency Tables and Venn Diagrams; Simple Probability; Joint Probability; Marginal Probability; Conditional Probability; Decision Trees; Marginal

	Probability Using the General Multiplication; Bayes' Theorem; The Probability Distribution for a Discrete Random Variable; The Normal Distribution and Other Continuous Distributions; Sampling and Sampling Distributions; Confidence Interval Estimation.
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Course Name	Physics I
Course No	PHYS105001
ECTS Credits	5
Language	Georgian
Lecturer	Zaza Metreveli z.metreveli@agruni.edu.ge
Prerequisites	None
Description	Classical Physics and Modern Technologies; Physical Units and SI System; Linear Motion; Kinematic Equations; Circular Motion; Velocity and Acceleration; Tangential Acceleration; Rotational Motion; Newton Laws; Forces in Physics: Elasticity and Hooke's Law, Friction. Newton's Law of Universal gravitation; Free Fall Motion; Impulse; Conservation of Energy; Force and Momentum; Pendulum Physics; Pressure and Pascal's Law; Electrical Forces; Coulomb's Law; Ohm's Law; Waves; Ideal Gas Law; Internal Energy; Intro to Geometrical Optics; Atom Structure and Radiation.

Course Name	Physics II
Course No	PHYS204004
ECTS Credits	4 + 1 (Laboratory Course PHYS201005)
Language	Georgian
Lecturer	Zaza Metreveli z.metreveli@agruni.edu.ge Zurab Jibuti z.jibuti@agruni.edu.ge
Prerequisites	Physics I
Description	Rotational Kinetic Energy; Inertia; Center of mass; Rigid body dynamics; Ohm's law for closed circuit; Energy dissipation in closed circuit; Magnetic field; Electromagnetic induction; AC current; Transformer; Condensation and Evaporation; Surface tension; Laplace's equation; Capillary action; First law of thermodynamics; Adiabatic process; Second law of thermodynamics; Heat engine; Geometrical optics; Light interference; Light dispersion; Spectrum analysis; Electromagnetic spectrum; Photoelectric effect; Introduction to

	nuclear physics; Nuclear chain reaction; Nuclear fusion; Radioactivity; Radioactive decay.
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Course Name	Physics III
Course No	PHYS204006
ECTS Credits	4 + 1 (Laboratory Course PHYS201007)
Language	Georgian
Lecturer	Zurab Jibuti z.jibuti@agrni.edu.ge
Prerequisites	Physics II
Description	Rolling; Equilibrium; Stiffness of a solid material; Young's modulus; Ideal fluid; Bernoulli's principle; Real fluid; Doppler effect; Supersonic speed; Convective heat transfer; Heat transfer; Electrical capacity; Dielectrics; Superconductivity; Semiconductors; Magnetism; Diamagnetic, paramagnetic and ferromagnetic materials; Electromagnetic wave; Polarization, reflection and transmission.

Course Name	Principles of Engineering
Course No	ENGI104001
ECTS Credits	4
Language	Georgian
Lecturer	Akaki Pagava a.pagava@agrni.edu.ge Revaz Makharoblidze r.makharoblidze@agrni.edu.ge Murad Kalabegashvili m.kalabegashvili@agrni.edu.ge Mamuka Benashvili m.benashvili@agrni.edu.ge
Prerequisites	None
Description	History and development of Engineering; Engineering disciplines; Natural Science and Art in Engineering; Problem solving in Engineering; Engineering Ethics; Engineering way of thinking. Difference and similarity between Mechanical, Civil and Electrical Engineering.

Course Name	Engineering Graphics I
Course No	CVEN304003

ECTS Credits	4
Language	Georgian
Lecturer	Merab Barsonidze m.barsonidze@agruni.edu.ge
Prerequisites	None
Description	Descriptive geometry; 3D projections; Projective geometry; Hand Drafting; Technical drawing; linear algebra.

Course Name	Engineering Graphics II
Course No	CAD304002
ECTS Credits	4
Language	Georgian
Lecturer	Merab Barsonidze m.barsonidze@agruni.edu.ge
Prerequisites	Engineering Graphics I
Description	Introduction to AutoCAD; Basic Commands in AutoCAD; Modifying and Manipulating Drawings in AutoCAD; 2D Drafting in AutoCAD; Different functionalities of AutoCAD; 3D solid modeling in AutoCAD; Editing and visualizing solids models in AutoCAD; Surface Modeling; Rendering in AutoCAD.

Course Name	Control Systems and Modelling
Course No	ENG304027
ECTS Credits	4
Language	Georgian
Lecturer	Irma Davitashvili i.davitashvili@agruni.edu.ge
Prerequisites	Mathematics III
Description	Control systems and their classification; Control Loops; Mathematical modelling; Feedback control systems; Logic control; Linear control; Proportional control; PID control; MATLAB syntax; programing in MATLAB; Control systems in MATLAB; Functions in MATLAB; Simulink; control systems in Simulink; PID control in Simulink.

Course Name	Measurements and Sensors I
Course No	ELEC204005
ECTS Credits	4
Language	Georgian
Lecturer	Tamaz Bichiashvili t.bichiashvili@agruni.edu.ge
Prerequisites	Physics II
Description	Basics of Measurements; Measurement Methods and Devices; Classification of Measurement Methods and Technical Characteristics; Precision and Error of Measurements; Electrical Measurement of Non Electric Units; Classification of Sensors; Resistive Sensors; Strain Gauge; Capacitive Sensors; Inductive and Electromagnetic Sensors; Thermo Sensors; Methods of Thermal Measurements; Equivalent Circuits.

Course Name	Measurements and Sensors II
Course No	ENG304023
ECTS Credits	4
Language	Georgian
Lecturer	Tamaz Bichiashvili t.bichiashvili@agruni.edu.ge
Prerequisites	Measurements and Sensors I
Description	Piezoelectric Sensors; Optoelectronic Sensors; Fiber-Optic Sensors; Infrared Radiation Detectors and How They work; Bio Sensors; Electrochemical and Ion-Selective Sensors; Measurement of Liquid and Air Flow; Environmental Measurements and Ecological Monitoring Systems; Analog and Digital Tools; Measurement of Power and Energy in AC/DC Circuits; Ultrasound Measurements; Measuring Linear and Angular Transformations; Movement Detectors and Touch Sensors.

Course Name	Electrical Circuits I
Course No	ELEC2030014
ECTS Credits	3 + 1 (Laboratory Course ELEC201015)
Language	Georgian

Lecturer	Eka Rurua e.rurua@agruni.edu.ge (LC) Edisher Midelashvili e.midelashvili@agruni.edu.ge
Prerequisites	None
Description	Basic components of electrical circuits, Voltage and current sources; Kirchhoff's laws; Equivalent star and delta networks; Potential diagram; Generation three-phase electric power; Complex Numbers; Ohm's and Kirchhoff's Voltage Law with Complex Numbers; RLC circuits; Electrical resonance; Power coefficient.

Course Name	Electrical Circuits II
Course No	ELEC203016
ECTS Credits	3 +1 (Laboratory Course ELEC201017)
Language	Georgian
Lecturer	Eka Rurua e.rurua@agruni.edu.ge (LC) Edisher Midelashvili e.midelashvili@agruni.edu.ge
Prerequisites	Electrical Circuits I
Description	Electromagnetic induction; Faraday's law of induction and Lenz's law; Self-inductance and mutual inductance; Linear Transformer; Phasor diagram of Three-phase system; Three phase star and delta connections; Power calculation in three phase system; Research of non-sinusoidal current using Fourier transform; Non-sinusoidal periodic currents; AC current, nonlinear circuits; Magnetic circuit; Current and voltage resonance; Inductor with magnetic core; Transient regime in linear circuits; Transient regime in RLC circuits.

Course Name	Electronics
Course No	ELEC204004
ECTS Credits	4
Language	Georgian
Lecturer	Maia Konjaria m.konjaria@agruni.edu.ge
Prerequisites	None

Description	Basics of Semiconductor devices; Characteristics of Semiconductors; P–N Junction; P–N Junction in forward and reverse bias; Capacitive Characteristics of P–N Junction; Diode classification; Avalanche diodes; Constant current diodes; Tunnel diodes; Gunn diodes; Laser diodes; Crystal diodes; Light-emitting diodes; Thermal diodes; Schottky diodes; Photodiodes; Zener diodes; Varicap; Stabistors; Bipolar Transistor; Common-base, common-emitter and common-collector configurations and their characteristics; Ebers-Moll model; Noise in bipolar transistors; Field-effect transistors; MOSFET; Insulated-gate bipolar transistor; Thyristor; Optoelectronics; Photoresistor; Phototransistor.
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Course Name	Technical Mechanics
Course No	
ECTS Credits	4
Language	Georgian
Lecturer	Roman Tskhvaradze r.cxvaradze@agruni.edu.ge
Prerequisites	Physics III
Description	

Course Name	Analog and Digital Circuits I
Course No	ELEC204006
ECTS Credits	4
Language	Georgian
Lecturer	Ramaz Gunia r.gunia@agruni.edu.ge
Prerequisites	Electronics
Description	Basics of electronics; Electrical signals and their Parameters; Amplifiers; Inverting Amplifier; Transistor Based Amplifier Types; Common-base Amplifier; Common-emitter Amplifier; Common-collector Amplifier; Operational Amplifier; Parameters of Operational Amplifier; Op-amp Differential Amplifier; Op-amp Integrator; Active Filters Using Op-amp; Signal Generator Using Op-amp; Analog Timer.

Course Name	Analog and Digital Circuits II
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Course No	ELEC304011
ECTS Credits	4
Language	Georgian
Lecturer	Ramaz Gunia r.gunia@agruni.edu.ge
Prerequisites	Analog and Digital Circuits I
Description	Basics of Digital Signals; Binary numbers; Operations on Binary numbers; Digital Logic Elements; Karnaugh map; Digital Decoders and Encoders; D Flip Flop; SR-Flip Flop; JK Flip Flop; T Flip Flop; Counters; Shift Registers; Digital Buffers, Analog to Digital Converter; Basics of Integrated circuits.

Course Name	Signal Processing I
Course No	ENG304021
ECTS Credits	5
Language	Georgian
Lecturer	Akaki Pagava a.pagava@agruni.edu.ge
Prerequisites	Measurements and Sensors I
Description	Classification of Signals; Basics of Signal Processing; Describing Signals with Mathematical Models; DSPWork; Classifying Determined and Random Signals; One Dimensional and Multidimensional Signals; Analog and Discrete Signals; Harmonics; Geometrical Methods in Signal Processing; Linear Space of Signals; Normalized Linear Space; Fourier Series; Spectral Representation of Signals; Fourier Transform; Laplace Transform; Analog Filters and Their Frequency Response; Calculating RLC Circuit Frequency Response.

Course Name	Signal Processing II
Course No	ENG304022
ECTS Credits	5
Language	Georgian
Lecturer	Akaki Pagava a.pagava@agruni.edu.ge
Prerequisites	Signal Processing I

Description	Analog and Digital Signals; Analog-to-Digital and Digital-to-Analog Conversions; Nyquist Frequency; Parallel Port; Reading and Writing to a Parallel Port; Parallel and Serial Codes; Fourier Transform; DAC based on R-2R Ladder; Fast Fourier Transform; Z Transform; ADC0804 Analog Commutator; Evaluating Autocorrelation Function; Printing Circuit of Multichannel ADC based on ADC0804; Recursive and Nonrecursive Filters; Digital Filters; Digital Differentiators and Integrators.
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Course Name	Digital Control I
Course No	ENG404044
ECTS Credits	5
Language	Georgian
Lecturer	Temur khundadze t.khundadze@agruni.edu.ge
Prerequisites	Mathematics III (for Engineers)
Description	Basics of Digital Control; Types and parameters of electrical signals; Analog to Digital Converters; Digital to Analog Converters; Electronic Feedback Systems; Pulse Width Modulation; Operational Amplifiers; Z-transform; PID controller; Sensor types and parameters.

Course Name	Digital Control II
Course No	ENG405045
ECTS Credits	5
Language	Georgian
Lecturer	Temur khundadze t.khundadze@agruni.edu.ge
Prerequisites	Digital Control I
Description	Programmable logic controllers; Features and parameters of PLC; Programmable logic relay (PLR); Programming of PLC; Zelio Soft 2; Functions and features of Zelio Soft 2.

Course Name	Principles of Programming
Course No	

ECTS Credits	4
Language	Georgian
Lecturer	George Macharashvili g.macharashvili@agruni.edu.ge
Prerequisites	None
Description	Introduction to Programming; History of C programming language; Preprocessor, Compiling and Linking; Variables in C; C Keywords; Operators in C; Decision Making and Loops in C; I/O operations in C; Basic Commands in Linux; Functions in C; Pointers; Arrays; Structures; Unions; Bit Fields; Typedef; C Preprocessor; Header Files; C Libraries; Using g++ compiler on Linux; Introduction to make on Linux; Error Handling.

Course Name	Programming I
Course No	CIS204003
ECTS Credits	4
Language	Georgian
Lecturer	George Macharashvili g.macharashvili@agruni.edu.ge
Prerequisites	Principles of Programming
Description	From C to C++; Linux operating system; Standard Linux Directories; Introduction to Drivers; Standard Template Library; Classes & Objects in C++; Inheritance, Overloading, Polymorphism in C++; Data Encapsulation; Namespaces; Dynamic Memory: new and delete in C++; Templates; Creating Class Libraries in C++; Exception Handling.

Course Name	Programming II
Course No	CIS304004
ECTS Credits	4
Language	Georgian
Lecturer	George Macharashvili g.macharashvili@agruni.edu.ge
Prerequisites	Programming I

Description	Continuation of Programming I; In depth study of C++; Classes in C++; iomanip; pipe in C++; Overloading; Templates; Standard Template Library; Exception Handling; Data Encapsulation; Namespaces; Dynamic Memory; iterator; Constructing Algorithms; Introduction to CERN ROOT.
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Course Name	Microprocessor I
Course No	ENG303039
ECTS Credits	3 +1 (Laboratory Course ENG301040)
Language	Georgian
Lecturer	Demur Shavadze d.shavadze@agruni.edu.ge
Prerequisites	Analog and Digital Circuits I
Description	History of microprocessors; Intel 8080 Architecture; Microcontroller architecture; Arithmetic logic unit (ALU); General Purpose Registers; FLAGS register; Stack Pointer; Program Counter; Address Bus; Control Bus; Data bus; Intel 8080 Assembler; Development from 8-bit to 64-bit microprocessors; RISC and CISC architectures; AVR and PIC 8-bit microcontrollers; Basics of ARM controllers; Architecture of AVR microcontrollers; Classifications AVR microcontrollers; Features of AVR microcontrollers; Programming AVR microcontrollers in Atmel Studio using C and Assembler; Block Programming Language FlowCode.

Course Name	Microprocessor II
Course No	ENG404042
ECTS Credits	3 + 1 (Laboratory Course ENG401043)
Language	Georgian
Lecturer	Demur Shavadze d.shavadze@agruni.edu.ge
Prerequisites	Microprocessor I
Description	AVR microcontroller; Programming AVR microcontrollers in Atmel Studio using C and Assembler; Programming AVR using Block Programming Language Flow Code; I/O ports in AVR; Timer-Counters in AVR; AC and ADC of AVR; SPI; I2C; USART; EEPROM; Watchdog Timer; 1-wire communications; Interrupt handling In AVR; Using ELF Files for debugging In Proteus; JTAG programming;

Course Name	Electromechanics I
Course No	ELEC304009
ECTS Credits	4
Language	Georgian
Lecturer	Eka Rurua e.rurua@agruni.edu.ge
Prerequisites	Electrical Circuits II
Description	Magnetic field; Magnetic Circuit; Ferromagnetism; Ohm's Law for Magnetic Circuits; Electromagnetic relays; In depth study of Ideal and Real Transformers; Construction of Transformers; Transformer types; DC motors, DC generators; Induction motors; Rotating magnetic field; Synchronous motors.

Course Name	Electromechanics II
Course No	ELEC404021
ECTS Credits	4
Language	Georgian
Lecturer	Edisher Midelashvili e.midelashvili@agruni.edu.ge
Prerequisites	Electromechanics I
Description	Electrical motors; Asymmetrical two-phase induction motor; Single-phase induction motor; Induction Motor Capacitor; Shaded-pole motor; Running three-phase asynchronous motor with single-phase supply; Permanent magnet synchronous motors; Synchronous reactive motor; Synchronous hysteresis motor; Universal motor; DC Permanent Magnet Motors; Piezoelectric motor; Tachogenerator; Synchro; Stepper motor; Linear motor; Electric Commutator; Vibro motor.

Course Name	Electromechanics III
Course No	ELEC404023
ECTS Credits	4
Language	Georgian
Lecturer	Maia Konjaria m.konjaria@agruni.edu.ge

Prerequisites	Electromechanics II
Description	Separately excited DC motor; DC motor with series excitation; Mixed excitation motor; Asynchronous Motor; Asynchronous motor dynamic braking; Separately excited DC motor speed control; Speed control of DC motor with series excitation; DC motor shunt; Squirrel-cage rotor; Wound rotor; Speed control of different asynchronous motors; Transient regime; Energy efficiency and thermal characteristics of motors; Motor control circuits.

Course Name	Electrical Safety
Course No	ELEC202003
ECTS Credits	2
Language	Georgian
Lecturer	Maia Konjaria m.konjaria@agruni.edu.ge
Prerequisites	None
Description	Effects of Current on Human; Protection in Case of Touching Conductor Under Voltage; Classifying Electrical Protective Devices; Protective Earthing and How it Works; Calculating Protective Ground; Neutral Protection; Protective Fuse; Rules of Electrical Protection During Exploitation of Aerial Lines, Power Plants, Generators and Motors; Rules of Electrical Protection During the Construction of Power Grid; Lightning Protection.

Course Name	Electrotechnical Materials
Course No	ELEC203007
ECTS Credits	4
Language	Georgian
Lecturer	Gela Natroshvili g.natroshvili@agruni.edu.ge
Prerequisites	Physics I
Description	Classifying Electrotechnical Materials by their State of Aggregation, Function and Conductivity; Insulation Materials; Liquid Insulation; Calculating Electrical Density of Liquid and Air Dielectrics; Conductive Materials; Superconductors; Volumetric and Surface Conductivity of an Insulator; High Resistance Materials used for Coil Wire; Solid Dielectrics; Magnetic Materials; Soft and Hard

	Magnetic Materials; Relation Between Conductivity and Temperature; Dielectric Permittivity; Ferromagnetism.
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Course Name	HVAC Systems Control
Course No	ENG404046
ECTS Credits	4
Language	Georgian
Lecturer	Tamaz Svanidze t.svanidze@agruni.edu.ge
Prerequisites	Digital Control I
Description	Introduction to Heating, Ventilation and Air Conditioning systems and General Algorithm; Sensor classification used in HVAC systems; Characterization of the Sensors; Heating Systems and Its Types of Control; Simple Thermal Calculation; Optimizing Power Usage; Ventilation Systems and Calculating Air Flow; Tools and Methods for Measuring Air Flow; Thermodynamics of Conditioning and Energy Balance; Classification of Refrigeration Aggregates by its Type; Working with Omron-E5CSV; Split Systems; Chillers; Usage of Negative Pressures.

Course Name	Power Electronics
Course No	ELEC403018
ECTS Credits	3 + 1 (Laboratory Course ELEC401019)
Language	Georgian
Lecturer	Ramaz Gunia r.gunia@agruni.edu.ge (LC) Zviad Baidashvili z.baidaschvili@agruni.edu.ge
Prerequisites	Electronics
Description	Power Electronics and Microelectronics; Secondary Power Sources; Power Diodes, Thyristors and Triacs; Calculating Continuous Power Source with Voltage Stabilization; Converters; Single Phase Converters; Voltage Lowering Impulse Stabilizers; Three Phase Full Bridge Rectifiers; Power Coefficient; Inverters; Autonomous Inverters; Resonant Inverters; Frequency Converters; AC/DC Voltage Converters.

Course Name	Power Systems and Their Protection
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Course No	ELEC405020
ECTS Credits	5
Language	Georgian
Lecturer	Ramaz Gunia r.gunia@agruni.edu.ge
Prerequisites	Electrical Circuits II
Description	Intro to Electrical Systems; Generating Power, Transmission, Distribution and Usage; Theoretical Basics of Electrical Circuits; Equivalent Circuits; High Power Transformers; Structures Autotransformers; Calculating Equivalent Parameters of Transformers and Autotransformers; Free Load and Short Circuit Usage; High Voltage Transmission Lines; Types of Electrical Stations; AC Three Phase Synchronous Generators; Low Power Distribution Systems; Electrical Safety of Energy Systems and Devices; Overloads and Short Circuits; Calculating Short Circuits Currents; Choosing Cables; Automatic Fuses.

Course Name	Computer Architecture / Computer Science
Course No	CS404005
ECTS Credits	4
Language	Georgian
Lecturer	Demur Shavadze d.shavadze@agruni.edu.ge
Prerequisites	None
Description	History of Computing; History of Computer Architecture and it's different types; Classification of Computer Systems; Structure of Computer and its Main Components; CPU, ALU, Registers, RAM; Types of Instructions; Cache Memory; BIOS; RISC and CISC Architecture; Development from Intel 4040 to i7; Bits, Bytes, Word, Double Word; Binary, Octal and Hexadecimal Systems; GPU; I/O Ports and Devices; External Memories(HDD, CD, DVD, Blu Ray).

Course Name	Operating Systems
Course No	CS404004
ECTS Credits	4
Language	Georgian
Lecturer	Zviad Mgaloblishvili z.mgaloblishvili@agruni.edu.ge

Prerequisites	None
Description	History of Operating Systems; Types and Structures; Intro to System Programming; Processes and Threads; Process Management problems; Memory Addresses; Segmentation; Paging, Virtual Memory; Files and Directories; I/O; Linux Programming; RTOS.

Course Name	Algorithms
Course No	CS404003
ECTS Credits	4
Language	Georgian
Lecturer	Demur Shavadze d.shavadze@agruni.edu.ge
Prerequisites	Mathematics III (for Engineers)
Description	Basics of Algorithms; Types and Examples of Algorithms; Time and Memory Complexity; Sorting Algorithms; Hash Functions; Double Hashing; Graph Theory; Dynamic Programming; Number Theory; NP-Complexity.

Course Name	Computer Networks
Course No	CS404002
ECTS Credits	4
Language	Georgian
Lecturer	Levan Jojua l.jojua@agruni.edu.ge
Prerequisites	Analog and Digital Circuits II
Description	Basics of Computer Networks; OSI Model; Types of Networks (WAN, LAN, MAN, SAN); Setting up a network; Cisco Packet Tracer; Networking Devices (Routers, Switches, Bridges and Hubs); TCP/IP Model; Remote Control with Telnet and SSH; Transport Layers; Networking Protocols IPv4, IPv6; Static and Dynamic Routing.

Course Name	Sophomore Project I, II
Course No	PROJ202950; PROJ202951
ECTS Credits	2 + 2

Language	Georgian
Lecturer	Akaki Pagava a.pagava@agruni.edu.ge
Prerequisites	Physics I; Electronics
Description	Introductions to Course Project; Introduction to Technical Report Writing; Introduction to Lab Equipment; Laboratory Safety; Techniques for Soldering; Printed Circuit Board (PCB) Manufacturing Technologies; Using Proteus Design Suite, NI Multisim, EAGLE. Working with Datasheets. Analog Microchips; Projects with Analog Microchips; Introduction to Texas Instruments and Analog Devices product Families.

Course Name	Junior Project I, II
Course No	PROJ303955; PROJ303956
ECTS Credits	3 + 3
Language	Georgian
Lecturer	Aleksandre Anasovi a.anasovi@agruni.edu.ge
Prerequisites	Analog and Digital Circuits I; Analog and Digital Circuits II
Description	Practical usage of Microcontrollers; Motorola, Atmel and Microchip Microcontrollers; Programming Microcontrollers; Memory and Memory Types; Microcontroller Simulations in Proteus Design Suite and NI Multisim; Serial Communication-RS232; 422-485 interface; Parallel Port Interface; USB; USB to COM and USB to LPT; SATA; I2C; SPI; 1-Wire; CAN bus; Modbus; KNX; TCP IP.

Course Name	Senior Project I, II
Course No	PROJ403964; PROJ404956
ECTS Credits	3 + 4
Language	Georgian
Lecturer	Aleksandre Anasovi a.anasovi@agruni.edu.ge Davit Akobia d.akobia@agruni.edu.ge
Prerequisites	Microprocessor I; Physics I

Description

Field Programmable Gate Array (FPGA); Xilinx's FPGA Family; ISE Design Suite; VHDL; EDA Tools; Translation of VHDL Code into a Circuit; VHDL Architecture, Entity; VHDL Data Types; Predefined Attributes; Value Kind Attributes; Function Kind Attributes; Signal Kind Attributes; Concurrent Code; Sequential Code; Packages and Components; Functions and Procedures; Finite State Machines; Serial-Parallel Multiplier; Multiply-Accumulate Circuits; Digital Filters; Neural Networks.