

VILNIUS GEDIMINAS TECHNICAL UNIVERSITY - VILNIUS TECH
 LIST OF COURSES OFFERED IN ENGLISH (updated on October 15, 2020)
 2020/2021 ACADEMIC YEAR



 optional (might not be available)

For course **description** please click on the **course code**

ECTS credits in parentheses show the number of credits students get for a course paper/project

SPRING SEMESTER COURSES					
Faculty	Course code	Course Title	Level	Semester	ECTS
Antanas Gustaitis' Aviation Institute	<u>AIAlA19402</u>	Aircraft General Knowledge: airframe	Integrated	Spring	6
Antanas Gustaitis' Aviation Institute	<u>AISVA19402</u>	Aviation English 2: rules of radiotelephony	Integrated	Spring	3
Antanas Gustaitis' Aviation Institute	<u>AISVA19603</u>	Aviation English 4	Integrated	Spring	3
Antanas Gustaitis' Aviation Institute	<u>AISVA19801</u>	Aviation English 6	Integrated	Spring	6
Antanas Gustaitis' Aviation Institute	<u>AISVA19403</u>	Flight Fundamentals	Integrated	Spring	3
Antanas Gustaitis' Aviation Institute	<u>AISVA19401</u>	General Navigation	Integrated	Spring	6
Antanas Gustaitis' Aviation Institute	<u>AISVA19601</u>	Meteorology	Integrated	Spring	9
Antanas Gustaitis' Aviation Institute	<u>AIAlA19801</u>	Unmanned Aerial Vehicles and their Systems	Integrated	Spring	3
Architecture	<u>ARPGA17017</u>	Aesthetics of Architecture	Integrated	Spring	3
Architecture	<u>ARURA16006</u>	Architecture and Heritage	Integrated	Spring	15
Architecture	<u>ARARA17005</u>	Architecture and technology	Integrated	Spring	15
Architecture	<u>ARPGA17018</u>	Architecture Research Methodology	Integrated	Spring	6
Architecture	<u>ARPGA19023</u>	Basics of Building Information Modeling	Integrated	Spring	3
Architecture	<u>ARPGA17005</u>	Contemporary art project and architecture	Integrated	Spring	3
Architecture	<u>ARPGA17003</u>	Drawing 2	Integrated	Spring	6
Architecture	<u>ARPGA17012</u>	History and Composition of Lithuanian Architecture	Integrated	Spring	6
Architecture	<u>ARPGA17010</u>	History of Architecture 1	Integrated	Spring	3
Architecture	<u>ARPGA17015</u>	History of Urban Form and Composition	Integrated	Spring	6
Architecture	<u>ARARA16003</u>	Practice of Architectural measurements	Integrated	Spring	3

Architecture	ARPGA17024	Protection of Immovable Cultural Heritage	Integrated	Spring	6
Architecture	ARPGA17016	Psychology and Ethics in Architecture	Integrated	Spring	3
Architecture	ARPGA17025	Theory of City Culture and Architectural Criticism	Integrated	Spring	6
Architecture	ARURA17003	Urban Structures	Integrated	Spring	15
Business Management	VVVKB17808	Business Communication	Bachelor	Spring	3
Business Management	VVTEB16403	Business Law	Bachelor	Spring	3
Business Management	VVTEB16204	Business Law	Bachelor	Spring	6
Business Management	VVTVB17272	Business Projects (with course work)	Bachelor	Spring	6
Business Management	VVFRB16401	Corporate Financial Management	Bachelor	Spring	6
Business Management	VVEIB17201	Economics of Public Sector (with course work)	Bachelor	Spring	6
Business Management	VVTVB17184	Engineering Principles	Bachelor	Spring	3
Business Management	VVTVB17087	Entrepreneurship (with course work)	Bachelor	Spring	6
Business Management	VVFRB17201	Essentials of Financial Decisions	Bachelor	Spring	3
Business Management	VVFRB20601	Financial Analysis	Bachelor	Spring	6
Business Management	VVFRB16607	Course Project of Financial Analysis	Bachelor	Spring	3
Business Management	VVFRB16606	Financial Markets and Institutions	Bachelor	Spring	3
Business Management	VVVKB17806	Human Resources Management	Bachelor	Spring	3
Business Management	VVTVB19801	Information Management Systems	Bachelor	Spring	3
Business Management	VVVKB17029	Intercultural Communication	Bachelor	Spring	3
Business Management	VVEIB20601	International Economics	Bachelor	Spring	3
Business Management	VVFRB17603	International Finance	Bachelor	Spring	3
Business Management	VVTEB16806	Law	Bachelor	Spring	3
Business Management	VVTEB16805	Law	Bachelor	Spring	3
Business Management	VVTVB17173	Logistics	Bachelor	Spring	6
Business Management	VVEIB17191	Macroeconomics	Bachelor	Spring	6
Business Management	VVVKB17157	Management	Bachelor	Spring	3
Business Management	VVVKB19807	Marketing Management	Bachelor	Spring	3
Business Management	VVVKB19804	Marketing Management Complex Project	Bachelor	Spring	6

Business Management	<u>VVEIB17801</u>	Microeconomics	Bachelor	Spring	6
Business Management	<u>VVTVB18301</u>	Negotiation in Business	Bachelor	Spring	3
Business Management	<u>VVFRB16601</u>	Pricing	Bachelor	Spring	6
Business Management	<u>VVEIB17027</u>	Regional Economics II: China	Bachelor	Spring	3
Business Management	<u>VVFRB16609</u>	Valuation of Financial Instruments	Bachelor	Spring	3
Business Management	<u>VVEIM18405</u>	Advanced Economics	Master	Spring	6
Business Management	<u>VVVKM17056</u>	International Management (with course project)	Master	Spring	9
Business Management	<u>VVTVM17152</u>	Managerial Information Technologies	Master	Spring	6
Business Management	<u>VVVKM17100</u>	Theory of Organization	Master	Spring	6
Civil Engineering	<u>STGGB17268</u>	Applied Physics	Bachelor	Spring	6
Civil Engineering	<u>STMEB17040</u>	Aluminium Structures	Bachelor	Spring	3
Civil Engineering	<u>STGGB17030</u>	Basis of Structural Design	Bachelor	Spring	3
Civil Engineering	<u>STVNB17311</u>	Building Construction Technology and Organization	Bachelor	Spring	3
Civil Engineering	<u>STGGB17173</u>	Engineering Geology	Bachelor	Spring	3
Civil Engineering	<u>STTMB17042</u>	Engineering Mechanics	Bachelor	Spring	6
Civil Engineering	<u>STGGB17195</u>	Foundation Engineering (with course project)	Bachelor	Spring	6
Civil Engineering	<u>STGSB17037</u>	Human's Safety	Bachelor	Spring	3
Civil Engineering	<u>STGSB17062</u>	Human's Safety and Environmental Protection	Bachelor	Spring	3
Civil Engineering	<u>STMEB17032</u>	Integrated Project (Steel Structures 2; Building Construction Technology and Organization)	Bachelor	Spring	6
Civil Engineering	<u>STGSB17174</u>	Materials Science and Building Materials	Bachelor	Spring	6
Civil Engineering	<u>STTMB17055</u>	Mechanics of Materials	Bachelor	Spring	6
Civil Engineering	<u>STTMB17053</u>	Mechanics of Materials	Bachelor	Spring	6
Civil Engineering	<u>STTMB17058</u>	Mechanics of Materials 2	Bachelor	Spring	6
Civil Engineering	<u>STGGB17053</u>	Multi-storey Buildings	Bachelor	Spring	3
Civil Engineering	<u>STTMB17105</u>	Numerical Analysis of Structures - BIM 2	Bachelor	Spring	3
Civil Engineering	<u>STGGB17037</u>	Reinforced Concrete Structures 2	Bachelor	Spring	6
Civil Engineering	<u>STGGB17038</u>	Reinforced Concrete Structures 2 (course project)	Bachelor	Spring	3
Civil Engineering	<u>STMEB17031</u>	Steel Structures 2	Bachelor	Spring	6

Civil Engineering	STVNB17303	Technology of Construction Processes	Bachelor	Spring	6
Civil Engineering	STMEM17148	Computer Aided Design of Bridges and Special Structures (BIM) (with course project)	Bachelor	Spring	9
Civil Engineering	STGGM17124	Durability and Probability Analysis of Building Structures	Master	Spring	6
Civil Engineering	STTMM17132	Mechanics of Continual Structures	Master	Spring	6
Civil Engineering	STMEM17150	Structures for Composite Steel and Concrete Buildings	Master	Spring	6
Creative Industries	KIKOB18601	Advertising (with course work)	Bachelor	Spring	6
Creative Industries	KIPIB18602	City studies	Bachelor	Spring	3
Creative Industries	KIKOB17077	Complex project	Bachelor	Spring	6
Creative Industries	KIKOB20107	Creative Industries Studies (with course work)	Bachelor	Spring	6
Creative Industries	KIKOB20102	Digital communication	Bachelor	Spring	6
Creative Industries	KIKOB20105	Innovation Management	Bachelor	Spring	6
Creative Industries	KIKOB18202	Mass Communication (with course work)	Bachelor	Spring	6
Creative Industries	KIFSB17109	Philosophy	Bachelor	Spring	3
Creative Industries	KIFSB17107	Philosophy	Bachelor	Spring	3
Creative Industries	KIFSA17003	Philosophy	Integrated	Spring	3
Creative Industries	KIKOB17065	Public relations	Bachelor	Spring	6
Creative Industries	KIKOB18402	Qualitative Reasearch (with course work)	Bachelor	Spring	6
Creative Industries/Language dep.	KIUSB17152	English Language	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSB18110	English Language	Bachelor	Spring	3
Creative Industries/Language dep.	KILSB18002	Lithuanian Language 2 (for Foreign Students)	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSB17188	Speciality English Language (<i>for Mechanics faculty students</i>)	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSB17185	Speciality English Language (<i>for Electronics faculty students</i>)	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSB17116	Speciality English Language (<i>for Civil Engineering, Architectural Engineering, Construction Technology and Management students</i>)	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSA17005	Speciality English Language (<i>for Architecture students</i>)	Integrated	Spring	3
Creative Industries/Language dep.	KIUSB17129	Speciality English Language 1 (<i>for Business Management faculty students</i>)	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSB17146	Speciality English Language 2 (<i>for Business Management faculty students</i>)	Bachelor	Spring	3

Creative Industries/Language dep.	KIUSB17123	Speciality English Language 2	Bachelor	Spring	3
Creative Industries/Language dep.	KIUSB17119	Speciality English Language 2 (<i>for Environmental Engineering faculty students</i>)	Bachelor	Spring	3
Creative Industries	KIKOB18401	Visual communication (with course work)	Bachelor	Spring	6
Electronics	ELEIB16661	Automatic Control Devices and Systems	Bachelor	Spring	6
Electronics	ELEIB16562	Automatic Control Systems (with course project)	Bachelor	Spring	6
Electronics	ELESB16403	Computer Architecture	Bachelor	Spring	6
Electronics	ELKRB16404	Computer Engineering Practicum	Bachelor	Spring	3
Electronics	ELKRB16201	Computer Logic	Bachelor	Spring	3
Electronics	ELESB16604	Computer Networks	Bachelor	Spring	6
Electronics	ELKRB16629	Computer Peripherals	Bachelor	Spring	3
Electronics	ELKRB16202	Databases	Bachelor	Spring	3
Electronics	ELKRB16618	Development of Embedded Computers	Bachelor	Spring	6
Electronics	ELESB16602	Digital Signal Processing	Bachelor	Spring	6
Electronics	ELESB16603	Digital Signal Processing	Bachelor	Spring	6
Electronics	ELEIB16403	Electrical Engineering	Bachelor	Spring	3
Electronics	ELEIB16251	Electrical Engineering	Bachelor	Spring	6
Electronics	ELEIB11252	Electrical Engineering	Bachelor	Spring	6
Electronics	ELESB16401	Electronic Devices	Bachelor	Spring	3
Electronics	ELEIB16651	Human Safety	Bachelor	Spring	3
Electronics	ELEIB16861	Industrial Logical Controllers	Bachelor	Spring	3
Electronics	ELESB16409	Information Systems Analysis	Bachelor	Spring	6
Electronics	ELKRB16822	Internet Technologies	Bachelor	Spring	3
Electronics	ELESB16612	Microcontrollers Systems	Bachelor	Spring	6
Electronics	ELKRB16612	Microprocessors	Bachelor	Spring	6
Electronics	ELKRB16630	Microprocessors and Their Programming	Bachelor	Spring	3
Electronics	ELKRB16823	Microtechnologies	Bachelor	Spring	3
Electronics	ELKRB16613	Microwave Technology	Bachelor	Spring	3
Electronics	ELESB16801	Multimedia Systems	Bachelor	Spring	3

Electronics	<u>ELESB16805</u>	Network Programming	Bachelor	Spring	3
Electronics	<u>ELESB16402</u>	Signals and Circuits 1	Bachelor	Spring	6
Electronics	<u>ELEIB16206</u>	Smart Electrical and Electronics Systems of Buildings	Bachelor	Spring	3
Electronics	<u>ELEIM17201</u>	Control of Electrical Energy Systems	Master	Spring	6
Electronics	<u>ELEIM17204</u>	Electronic Converters (with Course Project)	Master	Spring	9
Electronics	<u>ELEIM17203</u>	Modern Electrical Engineering	Master	Spring	6
Electronics	<u>ELESM17206</u>	Modern Operating Systems	Master	Spring	6
Electronics	<u>ELEIM17200</u>	Systemotechnique and Gauges	Master	Spring	6
Electronics	<u>ELESM17203</u>	Virtual Instrumentation	Master	Spring	6
Environmental Engineering	<u>APGDB16054</u>	Engineering Geodesy	Bachelor	Spring	3
Environmental Engineering	<u>APPEB16612</u>	Heat Production	Bachelor	Spring	6
Environmental Engineering	<u>APGDB16065</u>	Practice of Engineering Geodesy	Bachelor	Spring	3
Environmental Engineering	<u>APKLM91001</u>	Academic Writing and Innovations	Master	Spring	3
Environmental Engineering	<u>APAVM20107</u>	Anthropogenic Impact on Environment	Master	Spring	6
Environmental Engineering	<u>APAVM20106</u>	Circular Economy	Master	Spring	3
Environmental Engineering	<u>APAVM17144</u>	Environmental Audit	Master	Spring	3
Environmental Engineering	<u>APAVM17140</u>	Environmental Management (with course project)	Master	Spring	9
Environmental Engineering	<u>APKLM17001</u>	Innovative Scientific Solutions	Master	Spring	3
Environmental Engineering	<u>APKLM20101</u>	Scientific Research in Road Engineering	Master	Spring	6
Environmental Engineering	<u>APKLM93301</u>	Urban Public Transport	Master	Spring	3
Environmental Engineering	<u>APKLM18218</u>	Urban Transport System	Master	Spring	6
Environmental Engineering	<u>APAVM17141</u>	Waste Management (with course work)	Master	Spring	9
Fundamental Sciences	<u>FMFIB19223</u>	Applied Physics	Bachelor	Spring	3
Fundamental Sciences	<u>FMFIB16214</u>	Applied Physics	Bachelor	Spring	6
Fundamental Sciences	<u>FMFIB16216</u>	Applied Physics	Bachelor	Spring	3
Fundamental Sciences	<u>FMFIB16220</u>	Applied Physics	Bachelor	Spring	3
Fundamental Sciences	<u>FMISB19600</u>	Artificial Intelligence and Knowledge Systems	Bachelor	Spring	3
Fundamental Sciences	<u>FMFIB19214</u>	Environmental Physics	Bachelor	Spring	6

Fundamental Sciences	<u>FMITB20601</u>	Basics of Distributed Systems	Bachelor	Spring	6
Fundamental Sciences	<u>FMCHB16202</u>	Chemistry	Bachelor	Spring	3
Fundamental Sciences	<u>FMITB16811</u>	Corporate Systems Architecture	Bachelor	Spring	3
Fundamental Sciences	<u>FMITB16809</u>	Database Programming	Bachelor	Spring	3
Fundamental Sciences	<u>FMGSB19202</u>	Digital Image Technology	Bachelor	Spring	6
Fundamental Sciences	<u>FMMMMB16202</u>	Discrete Mathematics 2	Bachelor	Spring	6
Fundamental Sciences	<u>FMSAB19369</u>	Econometrics	Bachelor	Spring	6
Fundamental Sciences	<u>FMSAB19370</u>	Econometrics (course work)	Bachelor	Spring	3
Fundamental Sciences	<u>FMIGB17001</u>	General and Applied Engineering Graphics	Bachelor	Spring	6
Fundamental Sciences	<u>FMIGB16203</u>	General Engineering and Digital Graphics	Bachelor	Spring	6
Fundamental Sciences	<u>FMIGB16003</u>	General Engineering Graphics	Bachelor	Spring	6
Fundamental Sciences	<u>FMIGB16202</u>	General Engineering Graphics	Bachelor	Spring	3
Fundamental Sciences	<u>FMISB16000</u>	Information Security Fundamentals	Bachelor	Spring	3
Fundamental Sciences	<u>FMSAB19209</u>	Integral Calculus	Bachelor	Spring	6
Fundamental Sciences	<u>FMSAB16202</u>	Integral Calculus	Bachelor	Spring	6
Fundamental Sciences	<u>FMMMMB16201</u>	Integral Calculus	Bachelor	Spring	6
Fundamental Sciences	<u>FMMMMB16210</u>	Integrals, Differential Equations and Series	Bachelor	Spring	6
Fundamental Sciences	<u>FMMMMB16211</u>	Mathematics 2	Bachelor	Spring	6
Fundamental Sciences	<u>FMITB18307</u>	Object-Oriented Programming (with course work)	Bachelor	Spring	6
Fundamental Sciences	<u>FMFIB16229</u>	Physics 2	Bachelor	Spring	3
Fundamental Sciences	<u>FMSAB19206</u>	Probability Theory and Mathematical Statistics	Bachelor	Spring	9
Fundamental Sciences	<u>FMMMMB16209</u>	Probability theory and mathematical statistics	Bachelor	Spring	6
Fundamental Sciences	<u>FMISB16406</u>	Software Systems Engineering	Bachelor	Spring	6
Fundamental Sciences	<u>FMISM20201</u>	Computer Networks and Operating System Security	Master	Spring	9
Fundamental Sciences	<u>FMISM20202</u>	Ethical Hacking Techniques (with course work)	Master	Spring	6
Fundamental Sciences	<u>FMISM17205</u>	Software Security	Master	Spring	6
Fundamental Sciences	<u>FMISM17202</u>	Virtual Infrastructure and Cloud Computing Security	Master	Spring	6
Mechanics	<u>MEMKB17236</u>	Bachelor Graduation Thesis 2	Bachelor	Spring	6

Mechanics	MERSB17122	Bachelor Graduation Thesis 2	Bachelor	Spring	6
Mechanics	MEMKB17237	Bachelor Graduation Thesis 3	Bachelor	Spring	9
Mechanics	MERSB17123	Bachelor Graduation Thesis 3	Bachelor	Spring	9
Mechanics	MERSB17112	CAD/CAM/CAE	Bachelor	Spring	6
Mechanics	MERSB17107	Cognitive Practice	Bachelor	Spring	3
Mechanics	MEMKB18604	Course Project of Computer-Aided Design of Manufacturing Technologies	Bachelor	Spring	3
Mechanics	MEMKB17166	Design of Machines and Instruments 1	Bachelor	Spring	3
Mechanics	MERSB17120	Design of Mechatronic and Robotic Systems (with course project)	Bachelor	Spring	6
Mechanics	MEMKB17168	Ecological Design	Bachelor	Spring	6
Mechanics	MERSB17109	Elements of Mechatronics	Bachelor	Spring	3
Mechanics	MEMKB17239	Equipment Assembly Technologies	Bachelor	Spring	3
Mechanics	MEMKB17255	Fundamentals of Innovation Management	Bachelor	Spring	3
Mechanics	MERSB17401	Machine Elements (with course project)	Bachelor	Spring	6
Mechanics	MEMKB17379	Materials Science 1	Bachelor	Spring	3
Mechanics	MEMKB17151	Mechanical, Laser and Another Manufacturing Technologies	Bachelor	Spring	3
Mechanics	MERSB17113	Mechatronic Systems 2	Bachelor	Spring	6
Mechanics	MEMKB18605	Numerical Design of Manufacturing Technologies	Bachelor	Spring	6
Mechanics	MEMKB17165	Production Technology of Machines and Instruments	Bachelor	Spring	3
Mechanics	MERSB17121	Quality and Certification in the Automated Industry	Bachelor	Spring	6
Mechanics	MEMKB17167	Quality Management	Bachelor	Spring	3
Mechanics	MERSB17114	Robotical Technology	Bachelor	Spring	6
Mechanics	MEMKB17156	Theory and Practice of Measurements (with course project)	Bachelor	Spring	6
Mechanics	MEMKB17238	Tribology	Bachelor	Spring	3
Mechanics	MERSM17149	Academic Writing	Master	Spring	6
Mechanics	MEBIM17067	Biofluid Mechanics	Master	Spring	6
Mechanics	MEBIM17066	Biosignals Analysis and Recognition	Master	Spring	9
Mechanics	MERSM17162	Control of Mechatronic Systems	Master	Spring	6

Mechanics	MERSM17158	Control of Mechatronic Systems	Master	Spring	6
Mechanics	MEMKM17350	Design of Mechanical Systems (with course project)	Master	Spring	12
Mechanics	MERSM17163	Diagnostics in Mechatronics	Master	Spring	6
Mechanics	MERSM17159	Diagnostics in Mechatronics	Master	Spring	6
Mechanics	MEMKM17351	Engineering Ecology	Master	Spring	3
Mechanics	MEMKM20203	Experimental Mechanics	Master	Spring	6
Mechanics	MEMKM18201	Industrial Organisation and Strategic Management	Master	Spring	6
Mechanics	MEBIM17069	Information Systems in Medicine	Master	Spring	6
Mechanics	MEMKM17357	Innovation Strategy and Tactics	Master	Spring	6
Mechanics	MEMKM17358	Manufacturing Simulation and Industrial Production Systems	Master	Spring	6
Mechanics	MEMKM17352	Marketing of Innovative Products and Investment Management (with course work)	Master	Spring	9
Mechanics	MEMKM17360	Master Graduation Thesis 2	Master	Spring	3
Mechanics	MEMKM17349	Master Graduation Thesis 2	Master	Spring	3
Mechanics	MERSM17164	Master Graduation Thesis 2	Master	Spring	3
Mechanics	MEMKM17375	Master Graduation Thesis 4	Master	Spring	30
Mechanics	MERSM17176	Master Graduation Thesis 4	Master	Spring	30
Mechanics	MEMKM17374	Master Graduation Thesis 4	Master	Spring	30
Mechanics	MERSM17168	Mechanics of Mechatronic Systems	Master	Spring	6
Mechanics	MERSM17166	Modelling of Mechatronic Systems	Master	Spring	9
Mechanics	MERSM17150	Modelling of Mechatronic Systems	Master	Spring	6
Mechanics	MERSM17165	Sensors in Mechatronics	Master	Spring	6
Mechanics	MERSM17161	Sensors in Mechatronics	Master	Spring	6
Mechanics	MERSM17160	Smart Materials in Mechatronics	Master	Spring	6
Mechanics	MEMKM17346	Theory of Engineering Experiment (with course work)	Master	Spring	6
Transport Engineering	TIAIB17076	Automobile Transport Traffic Safety	Bachelor	Spring	3
Transport Engineering	TIAIB17053	Automotive Theory	Bachelor	Spring	6
Transport Engineering	TIAIB17054	Automotive Theory (course work)	Bachelor	Spring	3
Transport Engineering	TIMGB17119	Design Fundamentals	Bachelor	Spring	3

Transport Engineering	<u>TIMGB17122</u>	Diagnostic Methods of the Technological Equipment	Bachelor	Spring	3
Transport Engineering	<u>TIAIB17036</u>	Structural and Exploitational Materials of Road Vehicles	Bachelor	Spring	6
Transport Engineering	<u>TIMGB17031</u>	Technologies of Vehicle Production and Repair	Bachelor	Spring	3
Transport Engineering	<u>TIAIB17058</u>	Vehicles Design	Bachelor	Spring	6
Transport Engineering	<u>TIAIM17106</u>	Researches of Internal Combustion Engines	Master	Spring	6
Transport Engineering	<u>TIAIM17105</u>	Road Vehicle Safety (with course project)	Master	Spring	9