Computer Science

Field and Specializations description

Studying Computer Science provides graduates solid fundamentals in mathematics, physics, electronics and metrology, information theory, English and selected law aspects. However, the main focus is on general education in methods and techniques of programming – especially design and object programming, database systems, computer networks, operating systems including UNIX, Windows NT (Windows 200x), computer architecture, design and implementation of computer systems. Additionally, the graduate gains the knowledge of design and use of intelligent systems.

Specialization: Computer systems and networks

Additional abilities in computer systems and networks include advanced problems of wide and local area networks. Students learn administration of network operating system Novell NetWare, problems of local and wide area networks design, procedures of access to public networks in Poland. A substantial element of teaching are also issues of data transmission and network security. Finally, the education is enriched with information on application design, especially databases, system control and experiment systems.

Specialization: Internet and multimedia systems

Abilities in Internet techniques include mainly hypertext and dynamic WWW services programming with database access in wide area networks. Moreover, graduates learn about computer graphics systems. The overall education is complemented with knowledge on Internet applications, e-commerce, warehouses, law and social aspects of Internet. The graduate of Internet and multimedia systems specialization is not only a programmer of designer of Web pages. His knowledge includes also elements of wide and local networks design, exchange of information in Internet, graphics composition.

Specialization: Computer graphics

Additional abilities in computer graphics include – besides theoretical aspects of computer graphics and multimedia systems – the capability to use of advanced graphics 2D and 3D systems and graphical design. The specialization program includes also subjects of art (plastic composition), modern multimedia systems (modeling, animation, video assembly, multimedia presentation), advanced vector and raster graphics. Students gain a lot of practical abilities during many hours of laboratories equipped with adequate hardware and graphics software.

Specialization: Information Systems in Management

Additional abilities in information systems in management – besides basic knowledge of computer science applications – the capability to use computer systems in management and production. A solid experience in economics allows modelling of a bussines processes. After graduate one can find a job in distribution and management departments of software systems, in IT departments, analitical departments, as project managers in IT fields.

Admission requirements

The minimum requirement for admission to the degree program is the secondary school graduation certificate or an equivalent foreign document confirmed by the Polish education authorities. During the admission procedure the results in mathematics, English and one of the selected subjects: Polish, physics (physics and astronomy) or computer science from that certificate are taken into account.

Final examination

The diploma examination is an oral examination. During the examination the student should demonstrate a general understanding of field/specialization and the knowledge related to the dissertation.
The rules determining the final result of the studies are described in The Rules of Study at The Witelon University of Applied Sciences in Legnica. The final result is the sum of: 0,6 of the arithmetical mean of all the grades achieved during the study, 0,2 of the grade for the diploma thesis and 0,2 of the grade for the final exam.

Examination and assessment regulations

General examination and assessment regulations are described in detail in The Rules of Study at The Witelon University of Applied Sciences in Legnica. Assessment methods of individual courses are given in the programs of these courses.

ECTS departmental coordinator

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Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Main subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semestr 3						Semestr 4						Form of credit
			lc	c	l	p	s	ECTS	lc	c	l	p	s	ECTS	
Subjects of general education															
1	Physical education	60		30				0		30				0	Credit
2	English language	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30	30					2							Grade
Main subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			4	Grade
6	Computer Networks	90	30		30			5	30					5	G,E
7	Databases	60	30		30			6							Grade
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												0	Credit
Subjects for speciality															
11	Designing of the database systems	60							30			30		5	Exam
12	Visual programming	45							15		30			4	Grade
13	System Techniques Basics	60							30		30			4	Grade
14	Computer management systems	30							30					2	Grade
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**180**	**60**	**105**	**30**	**0**	**30**	
Overall hours in semester (year)		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semestr 5					ECTS	Semestr 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		30				1		30				2	G,E
Main subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	75							30			15	30	5	Exam
5	Methods of artificial intelligence	90	30		30			4					30	3	E,G
6	Practice	200													Credit
Subjects for speciality															
7	Mobile systems	45	15			30		3							Grade
8	UNIX administration	30			30			2							Grade
9	Administration of Windows Server	30									30			2	Grade
10	Selected Aspects of Computer Networks	60	30				30	6							Exam
11	Foundation of Computer Simulation	60							30		30			5	Exam
12	Diploma seminar	45					15	2					30	2	Grade
13	Monographic A	60	30				30	5							Grade
14	Monographic B	60							30				30	5	Grade
15	Diploma thesis							2						4	Grade
Overall hours/ECTS credits			**165**	**30**	**75**	**30**	**75**	**30**	**90**	**30**	**60**	**15**	**150**	**30**	
Overall hours in semester (year)		**720**	**375**						**345**						

Year IV

Lp.	Course name	Hours	Semestr 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Computer systems and networks design	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis							9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	**30**	
Overall hours in semester		**150**	**150**						

Overall hours – 2325

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2010

Year I

No.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							exam
3	Physics for engineers	48	24		24			5							grade
4	Introduction to technique	24	24					5							grade
5	Discrete mathematics	60							36	24				5	exam
6	Electronics and metrology - basic principles	48							24	24				6	exam
Main subjects															
7	Fundamentals of law in informatics	24	12	12				2							grade
8	Law aspects of IT market	24							12	12				2	grade
9	Introduction to Computer Engineering	24	12	12				5							exam
10	Fundamentals of programming I	48	24		24			6							grade
11	Fundamentals of programming II	48							24		24			6	grade
12	Algorithms and data structures	48							24		24			6	exam
13	Fundamentals of computer graphics	24							12		12			3	grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**162**	**60**	**60**	**0**	**0**	**30**	
Overall hours in semester (year)		**540**	**258**						**282**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2010

Year II

No.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				1	grade
Basic subjects															
2	Fundamentals of probabilistic and statistics methods	60	36	24				6							exam
3	Fundamentals of information theory	12	12					2							grade
Main subjects															
4	Object-oriented design and programming	48	12		12			5	12		12			4	grade
5	Computer Networks	72	12		36			5	24					5	G,E
6	Databases	36	24		12			6							exam
7	Computer architecture	48	24		24			5							exam
8	Operating Systems	48							24		24			5	exam
9	Practice	200												0	grade
Subjects for speciality															
10	Designing of the database systems	36							24			12		5	exam
11	Visual programming	24							12		12			4	grade
12	System Techniques Basics	36							24		12			4	grade
13	Computer management systems	12							12					2	grade
Overall hours/ECTS credits			**120**	**42**	**84**	**0**	**0**	**30**	**132**	**18**	**60**	**12**	**0**	**30**	
Overall hours in semester (year)		**468**	**246**						**222**						

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				2	G,E
Main subjects															
2	Designing and implementing information systems	48	24					2					24	2	grade
3	Microprocessor techniques and embeded systems	24	12		12			3							grade
4	Security of information systems	60							24			12	24	6	exam
5	Methods of artificial intelligence	48	12		12			4					24	3	E, G
6	Practice	200													grade
Subjects for speciality															
7	Mobile systems	24	12			12		3							grade
8	UNIX administration	24			24			2							grade
9	Administration of Windows Server	24									24			1	grade
10	Selected Aspects of Computer Networks	48	24				24	6							exam
11	Foundation of Computer Simulation	48							24		24			5	exam
12	Diploma seminar	36					12	2					24	2	grade
13	Monographic A	36	24				12	5							grade
14	Monographic B	36							24				12	5	grade
15	Diploma thesis	0						2						4	grade
Overall hours/ECTS credits			**108**	**18**	**48**	**12**	**48**	**30**	**72**	**18**	**48**	**12**	**108**	**30**	
Overall hours in semester (year)		**492**	**234**						**258**						

Year IV

No.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	grade
2	Team Project	24			24			7	grade
3	Computer systems and networks design	24			24			7	grade
4	Monographic C	36	24				12	5	grade
5	Diploma thesis	0						9	grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours in semester		**108**	**108**						

Overall hours – 1608

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Main subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semester 3						Semester 4						Form of credit
			lc	c	l	p	s	ECTS	lc	c	l	p	s	ECTS	
Subjects of general education															
1	Physical education	60		30				0		30				0	Credit
2	English language	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30	30					2							Grade
Main subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			4	Grade
6	Computer Networks	90	30		30			5	30					5	G, E.
7	Databases	60	30		30			6							Exam
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												0	Credit
Subjects for speciality															
11	Multimedia presentations	30							15			15		2	Grade
12	Visual programming	45							15		30			4	Grade
13	Advanced methods of computer graphics	60							30		30			6	Exam
14	Fundamentals of plastic compositions	60							15	30	15			3	Grade
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**150**	**90**	**120**	**15**	**0**	**30**	
Overall hours in semester (year)		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		30				1		30				2	G, E.
Main subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	75							30			15	30	5	Exam
5	Methods of artificial intelligence	90	30		30			4					30	3	E, G
6	Practice	200													Credit
Subjects for speciality															
7	Advanced methods of computer graphics	30		30				2							Grade
8	Mobile systems	45	15			30		2							Grade
9	Graphics programs and DTP	105	30		30			5	15		30			2	E, G
10	Digital assembly of multimedia files	30			30			2							Grade
11	Technical drawing and AUTO-CAD	75							30	15	30			5	Exam
12	Diploma seminar	45					15	2					30	2	Grade
13	Monographic A	60	30				30	5							Grade
14	Monographic B	60							30				30	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**60**	**105**	**30**	**45**	**30**	**105**	**45**	**60**	**15**	**150**	**30**	
Overall hours in semester (year)		**780**	**405**						**375**						

Year IV

Lp.	Course name	Hours	Semestr 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Design of graphics applications	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours in semester		**150**	**150**						

Overall hours – 2385

Major: Information technology
Specialization: Computer graphics **Non-stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1						Semester 2						Form of
			lc	c	l	p	s	ECTS	lc	c	l	p	s	ECTS	credit
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							exam
3	Physics for engineers	48	24		24			5							grade
4	Introduction to technique	24	24					5							grade
5	Discrete mathematics	60							36	24				5	exam
6	Electronics and metrology - basic principles	48							24	24				6	exam
Main subjects															
7	Fundamentals of law in informatics	24	12	12				2							grade
8	Law aspects of IT market	24							12	12				2	grade
9	Introduction to Computer Engineering	24	12	12				5							exam
10	Fundamentals of programming I	48	24		24			6							grade
11	Fundamentals of programming II	48							24		24			6	grade
12	Algorithms and data structures	48							24		24			6	exam
13	Fundamentals of computer graphics	24							12		12			3	grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**162**	**60**	**60**	**0**	**0**	**30**	
Overall hours in semester (year)		**540**	**258**						**282**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer graphics **Non-stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	48		30				1		18				1	grade
Basic subjects															
2	Fundamentals of probabilistic and statistics methods	60	36	24				6							exam
3	Fundamentals of information theory	12	12					2							grade
Main subjects															
4	Object-oriented design and programming	48	12		12			5	12		12			4	grade
5	Computer Networks	60	12		24			5	24					5	G, E
6	Databases	36	24		12			6							exam
7	Computer architecture	48	24		24			5							exam
8	Operating Systems	48							24		24			5	exam
9	Practice	200												0	grade
Subjects for speciality															
10	Multimedia presentations	36							24			12		2	grade
11	Visual programming	24							12		12			4	grade
12	Advanced methods of computer graphics	36							24		12			6	exam
13	Fundamentals of plastic compositions	36							12	12	12			3	grade
Overall hours/ECTS credits			**120**	**54**	**72**	**0**	**0**	**30**	**132**	**30**	**72**	**12**	**0**	**30**	
Overall hours in semester (year)		**492**	**246**						**246**						

Major: Information technology
Specialization: Computer graphics **Non-stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				2	G,E
Main subjects															
2	Designing and implementing information systems	48	24					2					24	2	grade
3	Microprocessor techniques and embeded systems	24	12		12			3							grade
4	Security of information systems	60							24			12	24	6	exam
5	Methods of artificial intelligence	48	12		12			4					24	3	E, G
6	Practice	200													grade
Subjects for speciality															
7	Advanced methods of computer graphics	24		24				2							grade
8	Mobile systems	24	12			12		2							grade
9	Graphics programs and DTP	72	24		12			5	12		24			2	E, G
10	Digital assembly of multimedia files	12			12			2							grade
11	Technical drawing and AUTO-CAD	48							24	12	12			4	exam
12	Diploma seminar	36					12	2					24	2	grade
13	Monographic A	36	24				12	5							grade
14	Monographic B	36							24				12	5	grade
15	Diploma thesis	0						2						4	grade
Overall hours/ECTS credits			**108**	**42**	**48**	**12**	**24**	**30**	**84**	**30**	**36**	**12**	**108**	**30**	
Overall hours in semester (year)		**504**	**234**						**270**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	grade
2	Team Project	24			24			7	grade
3	Design of graphics applications	24			24			7	grade
4	Monographic C	36	24				12	5	grade
5	Diploma thesis	0						9	grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours in semester		**108**	**108**						

Overall hours – 1644

Major: Information technology
Specialization: Internet systems **Stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	exam
6	Electronics and metrology - basic principles	60							30	30				6	exam
Main subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**30**	**195**	**75**	**75**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Internet systems **Stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semester 3						Semester 4						Form of credit
			lc	c	l	p	s	ECTS	lc	c	l	p	s	ECTS	
Subjects of general education															
1	Physical education	60		30				0		30				0	Credit
2	English language	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							exam
4	Fundamentals of information theory	30	30					2							Grade
Main subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			4	Grade
6	Computer Networks	90	30		30			5	30					5	G, E
7	Databases	60	30		30			6							exam
8	Computer architecture	60	30		30			5							exam
9	Operating Systems	60							30		30			5	exam
10	Practice	200												0	Credit
Subjects for speciality															
11	Hypertext languages	60							30		30			4	exam
12	Visual programming	45							15		30			3	Grade
13	Fundamentals of plastic composition	15							15					2	Grade
14	Internet programming	45							15		30			3	Grade
15	Internet database systems	30							15		15			3	exam
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**165**	**60**	**150**	**0**	**0**	**30**	
Overall hours in semester (year)		**765**	**390**						**375**						

Major: Information technology
Specialization: Internet systems **Stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		30				1		30				2	G, E
Main subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	75							30			15	30	5	Exam
5	Methods of artificial intelligence	90	30		30			4					30	3	E, G
6	Practice	200												0	Credit
Subjects for speciality															
7	Internet programming	45	15			30		4							Exam
8	Mobile systems	45	15			30		3							Grade
9	UNIX administration	30			30			2							Grade
10	Digital assembly of multimedia files	30			30			2							Grade
11	Administration of Windows Server	30									30			2	Grade
12	Data warehouses for e-business	60							30				30	5	Exam
13	Diploma seminar	45					15	2					30	2	Grade
14	Monographic A	60	30				30	5							Grade
15	Monographic B	60							30				30	5	Grade
16	Diploma thesis							2						4	Grade
Overall hours/ECTS credits			**150**	**30**	**105**	**60**	**45**	**30**	**90**	**30**	**30**	**15**	**180**	**30**	
Overall hours in semester (year)		**735**	**390**						**345**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Desing of internet applications	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis							9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours in semester		**150**	**150**						

Overall hours – 2340

Major: Information technology
Specialization: Internet systems **Non-stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							exam
3	Physics for engineers	48	24		24			5							grade
4	Introduction to technique	24	24					5							grade
5	Discrete mathematics	60							36	24				5	exam
6	Electronics and metrology - basic principles	48							24	24				6	exam
Main subjects															
7	Fundamentals of law in informatics	24	12	12				2							grade
8	Law aspects of IT market	24							12	12				2	grade
9	Introduction to Computer Engineering	24	12	12				5							exam
10	Fundamentals of programming I	48	24		24			6							grade
11	Fundamentals of programming II	48							24		24			6	grade
12	Algorithms and data structures	48							24		24			6	exam
13	Fundamentals of computer graphics	24							12		12			3	grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**162**	**60**	**60**	**0**	**0**	**30**	
Overall hours in semester (year)		**540**	**258**						**282**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Internet systems **Non-stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				1	grade
Basic subjects															
2	Fundamentals of probabilistic and statistics methods	60	36	24				6							exam
3	Fundamentals of information theory	12	12					2							grade
Main subjects															
4	Object-oriented design and programming	48	12		12			5	12		12			4	grade
5	Computer Networks	60	12		24			5	24					5	G, E
6	Databases	36	24		12			6							exam
7	Computer architecture	48	24		24			5							exam
8	Operating Systems	48							24		24			5	exam
9	Practice	200												0	grade
Subjects for speciality															
10	Hypertext languages	36							24		12			4	exam
11	Visual programming	24							12		12			3	grade
12	Fundamentals of plastic composition	12							12					2	grade
13	Internet programming	24							12		12			3	grade
14	Internet database systems	36							24		12			3	exam
Overall hours/ECTS credits			**120**	**54**	**72**	**0**	**0**	**30**	**144**	**30**	**84**	**0**	**0**	**30**	
Overall hours in semester (year)		**492**	**246**						**246**						

Major: Information technology
Specialization: Internet systems **Non-stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	36		18				1		18				2	G, E
Main subjects															
2	Designing and implementing information systems	48	24					2					24	2	grade
3	Microprocessor techniques and embeded systems	24	12		12			3							grade
4	Security of information systems	60							24			12	24	6	exam
5	Methods of artificial intelligence	48	12		12			4					24	3	E, G
6	Practice	200													grade
Subjects for speciality															
7	Internet programming	36	24			12		4							exam
8	Mobile systems	24	12			12		3							grade
9	UNIX administration	24			24			2							grade
10	Digital assembly of multimedia files	12			12			2							grade
11	Administration of Windows Server	24									24			1	grade
12	Data warehouses for e-business	36							24				12	5	exam
13	Diploma seminar	36					12	2					24	2	grade
14	Monographic A	36	24				12	5							grade
15	Monographic B	36							24				12	5	grade
16	Diploma thesis	0						2						4	grade
Overall hours/ECTS credits			**108**	**18**	**60**	**24**	**24**	**30**	**72**	**18**	**24**	**12**	**120**	**30**	
Overall hours in semester (year)		**480**	**234**						**246**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	grade
2	Team Project	24			24			7	grade
3	Desing of internet applications	24			24			7	grade
4	Monographic C	36	24				12	5	grade
5	Diploma thesis	0						9	grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours in semester		**108**	**108**						

Overall hours – 1656

Major: Information technology
Specialization: Information systems in management **Stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Main subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Information systems in management **Stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Physical education	60		30				0		30				0	Credit
2	English language	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30	30					2							Grade
Main subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			4	Grade
6	Computer Networks	90	30		30			5	30					5	G, E
7	Databases	60	30		30			6							Exam
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												0	Credit
Subjects for speciality															
11	Enterprise basics	30							30					2	Grade
12	Computer simulation	45							15		30			4	Grade
13	Production management	30							15	15				2	Grade
14	Accounting management	30							15		15			2	Grade
15	Operational research for engineers	60							30		30			5	Exam
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**180**	**75**	**120**	**0**	**0**	**30**	
Overall hours in semester (year)		**765**	**390**						**375**						

Major: Information technology
Specialization: Information systems in management **Stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semestr 5					ECTS	Semestr 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		30				1		30				2	G, E
Main subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	75							30			15	30	5	Exam
5	Methods of artificial intelligence	90	30		30			4					30	3	E, G
6	Practice	200													Credit
Subjects for speciality															
7	Staff management	30	15	15				2							Grade
8	Management of IT project	30	15				15	4							Exam
9	UNIX administration	30			30			2							Grade
10	Mobile systems	45	15			30		3							Grade
11	Administration of Windows Server	30										30		2	Grade
12	Integrated information systems	60							30			30		5	Exam
13	Diploma seminar	45					15	2					30	2	Grade
14	Monographic A	60	30				30	5							Grade
15	Monographic B	60							30				30	5	Grade
16	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**45**	**75**	**30**	**90**	**30**	**90**	**30**	**0**	**75**	**150**	**30**	
Overall hours in semester (year)		**720**	**375**						**345**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Desing of information systems	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours in semester		**150**	**150**						

Overall hours – 2325

Major: Information technology
Specialization: Information systems in management **Non-stationary**
Recruitment: 2010

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							exam
3	Physics for engineers	48	24		24			5							grade
4	Introduction to technique	24	24					5							grade
5	Discrete mathematics	60							36	24				5	exam
6	Electronics and metrology - basic principles	48							24	24				6	exam
Main subjects															
7	Fundamentals of law in informatics	24	12	12				2							grade
8	Law aspects of IT market	24							12	12				2	grade
9	Introduction to Computer Engineering	24	12	12				5							exam
10	Fundamentals of programming I	48	24		24			6							grade
11	Fundamentals of programming II	48							24		24			6	grade
12	Algorithms and data structures	48							24		24			6	exam
13	Fundamentals of computer graphics	24							12		12			3	grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**162**	**60**	**60**	**0**	**0**	**30**	
Overall hours in semester (year)		**540**	**258**						**282**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Information systems in management **Non-stationary**
Recruitment: 2010

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				1	grade
Basic subjects															
2	Fundamentals of probabilistic and statistics methods	60	36	24				6							exam
3	Fundamentals of information theory	12	12					2							grade
Main subjects															
4	Object-oriented design and programming	48	12		12			5	12		12			4	grade
5	Computer Networks	60	12		24			5	24					5	G, E
6	Databases	36	24		12			6							exam
7	Computer architecture	48	24		24			5							exam
8	Operating Systems	48							24		24			5	exam
9	Practice	200												0	grade
Subjects for speciality															
10	Enterprise basics	24							24					2	grade
11	Computer simulation	24							12		12			4	grade
12	Production management	24							12	12				2	grade
13	Accounting management	24							12		12			2	grade
14	Operational research for engineers	36							24		12			5	exam
Overall hours/ECTS credits			**120**	**42**	**72**	**0**	**0**	**30**	**144**	**30**	**72**	**0**	**0**	**30**	
Overall hours in semester (year)		**480**	**234**						**246**						

Major: Information technology
Specialization: Information systems in management **Non-stationary**
Recruitment: 2010

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				2	G, E
Main subjects															
2	Designing and implementing information systems	48	24					2					24	2	grade
3	Microprocessor techniques and embeded systems	24	12		12			3							grade
4	Security of information systems	60							24			12	24	6	exam
5	Methods of artificial intelligence	48	12		12			4					24	3	E, G
6	Practice	200													grade
Subjects for speciality															
7	Staff management	24	12	12				2							grade
8	Management of IT project	24	12				12	4							exam
9	UNIX administration	24			24			2							grade
10	Mobile systems	24	12			12		3							grade
11	Administration of Windows Server	24										24		1	grade
12	Integrated information systems	36							24			12		5	exam
13	Diploma seminar	36					12	2					24	2	grade
14	Monographic A	36	24				12	5							grade
15	Monographic B	36							24				12	5	grade
16	Diploma thesis	0						2						4	grade
Overall hours/ECTS credits			**108**	**30**	**48**	**12**	**36**	**30**	**72**	**18**	**0**	**48**	**108**	**30**	
Overall hours in semester (year)		**480**	**234**						**246**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	grade
2	Team Project	24			24			7	grade
3	Desing of information systems	24			24			7	grade
4	Monographic C	36	24				12	5	grade
5	Diploma thesis	0						9	grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours in semester		**108**	**108**						

Overall hours – 1620

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2009

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Main subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2009

Year II

Lp.	Course name	Hours	Semestr 3						Semestr 4						Form of credit
			lc	c	l	p	s	ECTS	lc	c	l	p	s	ECTS	
Subjects of general education															
1	Physical education	60		30				0		30				0	Credit
2	English language	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30	30					2							Grade
Main subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			4	Grade
6	Computer Networks	90	30		30			5	30					5	G,E
7	Databases	60	30		30			6							Grade
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												0	Credit
Subjects for speciality															
11	Designing of the database systems	60							30			30		5	Exam
12	Visual programming	45							15		30			4	Grade
13	System Techniques Basics	60							30		30			4	Grade
14	Computer management systems	30							30					2	Grade
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**180**	**60**	**105**	**30**	**0**	**30**	
Overall hours in semester (year)		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2009

Year III

Lp.	Course name	Hours	Semestr 5					ECTS	Semestr 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		30				1		30				2	G,E
Main subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	75							30			15	30	5	Exam
5	Methods of artificial intelligence	90	30		30			4					30	3	E,G
6	Practice	200													Credit
Subjects for speciality															
7	Mobile systems	45	15			30		3							Grade
8	UNIX administration	30			30			2							Grade
9	Administration of Windows Server	30									30			2	Grade
10	Selected Aspects of Computer Networks	60	30				30	6							Exam
11	Foundation of Computer Simulation	60							30		30			5	Exam
12	Diploma seminar	45					15	2					30	2	Grade
13	Monographic A	60	30				30	5							Grade
14	Monographic B	60							30				30	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**30**	**75**	**30**	**75**	**30**	**90**	**30**	**60**	**15**	**150**	**30**	
Overall hours in semester (year)		**720**	**375**						**345**						

Year IV

Lp.	Course name	Hours	Semestr 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Computer systems and networks design	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	**30**	
Overall hours in semester		**150**	**150**						

Overall hours – 2325

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2009

Year I

No.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							exam
3	Physics for engineers	48	24		24			5							grade
4	Introduction to technique	24	24					5							grade
5	Discrete mathematics	60							36	24				5	exam
6	Electronics and metrology - basic principles	48							24	24				6	exam
Main subjects															
7	Fundamentals of law in informatics	24	12	12				2							grade
8	Law aspects of IT market	24							12	12				2	grade
9	Introduction to Computer Engineering	24	12	12				5							exam
10	Fundamentals of programming I	48	24		24			6							grade
11	Fundamentals of programming II	48							24		24			6	grade
12	Algorithms and data structures	48							24		24			6	exam
13	Fundamentals of computer graphics	24							12		12			3	grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**162**	**60**	**60**	**0**	**0**	**30**	
Overall hours in semester (year)		**540**	**258**						**282**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2009

Year II

No.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	36		18				1		18				1	grade
Basic subjects															
2	Fundamentals of probabilistic and statistics methods	60	36	24				6							exam
3	Fundamentals of information theory	12	12					2							grade
Main subjects															
4	Object-oriented design and programming	48	12		12			5	12		12			4	grade
5	Computer Networks	72	12		36			5	24					5	G,E
6	Databases	36	24		12			6							exam
7	Computer architecture	48	24		24			5							exam
8	Operating Systems	48							24		24			5	exam
9	Practice	200												0	grade
Subjects for speciality															
10	Designing of the database systems	36							24			12		5	exam
11	Visual programming	24							12		12			4	grade
12	System Techniques Basics	36							24		12			4	grade
13	Computer management systems	12							12					2	grade
Overall hours/ECTS credits			**120**	**42**	**72**	**0**	**0**	**30**	**132**	**18**	**60**	**12**	**0**	**30**	
Overall hours in semester (year)		**456**	**234**						**222**						

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2009

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		18				1		18				2	G,E
Main subjects															
2	Designing and implementing information systems	48	24					2					24	2	grade
3	Microprocessor techniques and embeded systems	24	12		12			3							grade
4	Security of information systems	60							24			12	24	6	exam
5	Methods of artificial intelligence	48	12		12			4					24	3	E, G
6	Practice	200													grade
Subjects for speciality															
7	Mobile systems	24	12			12		3							grade
8	UNIX administration	24			24			2							grade
9	Administration of Windows Server	24									24			1	grade
10	Selected Aspects of Computer Networks	48	24				24	6							exam
11	Foundation of Computer Simulation	48							24		24			5	exam
12	Diploma seminar	36					12	2					24	2	grade
13	Monographic A	36	24				12	5							grade
14	Monographic B	36							24				12	5	grade
15	Diploma thesis	0						2						4	grade
Overall hours/ECTS credits			**108**	**18**	**48**	**12**	**48**	**30**	**72**	**18**	**48**	**12**	**108**	**30**	
Overall hours in semester (year)		**492**	**234**						**258**						

Year IV

No.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	grade
2	Team Project	24			24			7	grade
3	Computer systems and networks design	24			24			7	grade
4	Monographic C	36	24				12	5	grade
5	Diploma thesis	0						9	grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours in semester		**108**	**108**						

Overall hours – 1608

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2009

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Main subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2009

Year II

Lp.	Course name	Hours	Semester 3						Semester 4						Form of credit
			lc	c	l	p	s	ECTS	lc	c	l	p	s	ECTS	
Subjects of general education															
1	Physical education	60		30				0		30				0	Credit
2	English language	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30	30					2							Grade
Main subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			4	Grade
6	Computer Networks	90	30		30			5	30					5	G, E.
7	Databases	60	30		30			6							Exam
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												0	Credit
Subjects for speciality															
11	Multimedia presentations	30							15			15		2	Grade
12	Visual programming	45							15		30			4	Grade
13	Advanced methods of computer graphics	60							30		30			6	Exam
14	Fundamentals of plastic compositions	60							15	30	15			3	Grade
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**150**	**90**	**120**	**15**	**0**	**30**	
Overall hours in semester (year)		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2009

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English language	60		30				1		30				2	G, E.
Main subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	75							30			15	30	5	Exam
5	Methods of artificial intelligence	90	30		30			4					30	3	E, G
6	Practice	200													Credit
Subjects for speciality															
7	Advanced methods of computer graphics	30		30				2							Grade
8	Mobile systems	45	15			30		2							Grade
9	Graphics programs and DTP	105	30		30			5	15		30			2	E, G
10	Digital assembly of multimedia files	30			30			2							Grade
11	Technical drawing and AUTO-CAD	75							30	15	30			5	Exam
12	Diploma seminar	45					15	2					30	2	Grade
13	Monographic A	60	30				30	5							Grade
14	Monographic B	60							30				30	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**60**	**105**	**30**	**45**	**30**	**105**	**45**	**60**	**15**	**150**	**30**	
Overall hours in semester (year)		**780**	**405**						**375**						

Year IV

Lp.	Course name	Hours	Semestr 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Design of graphics applications	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours in semester		**150**	**150**						

Overall hours – 2385

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2008

Year I

No.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							exam
3	Physics for engineers	60	30		30			5							grade
4	Introduction to technique	30	30					5							grade
5	Discrete mathematics	60							30	30				5	exam
6	Electronics and metrology - basic principles	60							30	30				6	exam
Field subjects															
7	Fundamentals of law in informatics	45	30	15				2							grade
8	Law aspects of IT market	45							30	15				2	grade
9	Introduction to Computer Engineering	60	30	30				5							exam
10	Fundamentals of programming I	60	30		30			6							grade
11	Fundamentals of programming II	60							30		30			6	grade
12	Algorithms and data structures	60							30		30			6	exam
13	Fundamentals of computer graphics	30							15		15			3	grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2008

Year II

No.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Physical education	60		30				1		30				1	grade
2	English	60		30				1		30				1	grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							exam
4	Fundamentals of information theory	30							30					2	grade
Field subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			3	grade
6	Computer Networks	90	30		30			5	30					3	G, E
7	Databases	60	30		30			5							exam
8	Computer architecture	60	30		30			5							exam
9	Operating Systems	60							30		30			5	exam
10	Practice	200												2	grade
Subjects for speciality															
11	Designing of the database systems	60							30			30		5	exam
12	Visual programming	45							15		30			4	grade
13	System Techniques Basics	60	30					2			30			2	grade
14	Computer management systems	30							30					2	grade
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**180**	**60**	**105**	**30**	**0**	**30**	
Overall hours in semester (year) without practice		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2008

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				2	G, E
Field subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	60							30			15	15	4	Exam
5	Methods of artificial intelligence	90	30		30			4					30	2	E, G
6	Practice	200												2	Grade
Subjects for speciality															
7	Mobile systems	45	15			30		3							Grade
8	UNIX administration	30			30			2							Grade
9	Administration of Windows 2003	30									30			2	Grade
10	Selected Aspects of Computer Networks	60	30				30	6							Exam
11	Foundation of Computer Simulation	60							30		30			5	Exam
12	Diploma seminar	45					15	2					30	2	Grade
13	Monographic A	60	30				30	5							Grade
14	Monographic B	60							30				30	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**30**	**75**	**30**	**75**	**30**	**90**	**30**	**60**	**15**	**135**	**30**	
Overall hours in semester (year) without practice		**705**	**375**						**330**						

Year IV

No.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Computer systems and networks design	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours :		**150**	**150**						

Overall hours - 2310

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2008

Year I

No.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							Exam
3	Physics for engineers	48	24		24			5							Grade
4	Introduction to technique	24	24					5							Grade
5	Discrete mathematics	60							36	24				5	Exam
6	Electronics and metrology - basic principles	48							24	24				6	Exam
Field subjects															
7	Fundamentals of law in informatics	24	12	12				2							Grade
8	Law aspects of IT market	24							12	12				2	Grade
9	Introduction to Computer Engineering	24	12	12				5							Exam
10	Fundamentals of programming I	48	24		24			6							Grade
11	Fundamentals of programming II	48							24		24			6	Grade
12	Algorithms and data structures	24							12		12			6	Exam
13	Fundamentals of computer graphics	24							12		12			3	Grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**150**	**60**	**48**	**0**	**0**	**30**	
Overall hours in semester (year)		**516**	**258**						**258**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2008

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Physical education	60		30				1		30				1	Grade
2	Engilsh	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	36	24				6							Exam
4	Fundamentals of information theory	12							12					2	Grade
Field subjects															
5	Object-oriented design and programming	48	12		12			5	12		12			3	Grade
6	Computer Networks	60	12		24			5	24					4	G, E
7	Databases	36	24		12			6							Exam
8	Computer architecture	36	24		12			5							Exam
9	Operating Systems	36							24		12			5	Exam
10	Practice	200												2	Grade
Subjects for speciality															
11	Designing of the database systems	36							24			12		5	Exam
12	Visual programming	24							12		12			4	Grade
13	System Techniques Basics	36	24					2			12			2	Grade
14	Computer management systems	12							12					2	Grade
Overall hours/ECTS credits			**132**	**84**	**60**	**0**	**0**	**31**	**120**	**60**	**48**	**12**	**0**	**31**	
Overall hours in semester (year) without practice		**516**	**276**						**240**						

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2008

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				2	G, E
Field subjects															
2	Designing and implementing information systems	36	12					2					24	2	Grade
3	Microprocessor techniques and embeded systems	24	12		12			3							Grade
4	Security of information systems	36							12			12	12	5	Exam
5	Methods of artificial intelligence	48	12		12			4					24	2	E, G
6	Practice	200												2	Grade
Subjects for speciality															
7	Mobile systems	24	12			12		3							Grade
8	UNIX administration	24			24			2							Grade
9	Administration of Windows 2003	24									24			2	Grade
10	Selected Aspects of Computer Networks	48	24				24	6							Exam
11	Foundation of Computer Simulation	48							24		24			5	Exam
12	Diploma seminar	36					12	2					24	2	Grade
13	Monographic A	36	24				12	5							Grade
14	Monographic B	36							24				12	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**96**	**30**	**48**	**12**	**48**	**30**	**60**	**30**	**48**	**12**	**96**	**31**	
Overall hours in semester (year) without practice		**480**	**234**						**246**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	Grade
2	Team Project	24			24			7	Grade
3	Computer systems and networks design	24			24			7	Grade
4	Monographic C	36	24				12	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours :		**108**	**108**						

Overall hours – 1704

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2008

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Field subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2008

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Physical education	60		30				1		30				1	Grade
2	English	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30							30					2	Grade
Field subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			3	Grade
6	Computer Networks	90	30		30			5	30					3	G, E
7	Databases	60	30		30			5							Exam
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												2	Grade
Subjects for speciality															
11	Multimedia presentations	30	15		0	15		2							Grade
12	Visual programming	45							15		30			4	Grade
13	Advanced methods of computer graphics	60							30		30			6	Exam
14	Fundamentals of plastic compositions	60							15	30	15			3	Grade
Overall hours/ECTS credits			**165**	**90**	**120**	**15**	**0**	**30**	**165**	**90**	**120**	**0**	**0**	**30**	
Overall hours in semester (year) without practice		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2008

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				2	G, E
Field subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	60							30			15	15	4	Exam
5	Methods of artificial intelligence	90	30		30			4					30	2	E,G
6	Practice	200												2	Grade
Subjects for speciality															
7	Advanced methods of computer graphics	30		30				3							Grade
8	Mobile systems	45	15			30		3							Grade
9	Graphics programs and DTP	105	30		30			5	15		30			4	E, G
10	Digital assembly of multimedia files	30			30			2							Grade
11	Technical drawing and AUTO-CAD	75							30	15	30			5	Exam
12	Monographic A	60	30				30	5							Grade
13	Monographic B	60							30				30	5	Grade
14	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**60**	**105**	**30**	**30**	**30**	**105**	**45**	**60**	**15**	**105**	**30**	
Overall hours in semester (year) without practice		**720**	**390**						**330**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Design of graphics applications	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours :		**150**	**150**						

Overall hours – 2325

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2007

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Field subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2007

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Physical education	60		30				1		30				1	Grade
2	English	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30							30					2	Grade
Field subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			3	Grade
6	Computer Networks	90	30		30			5	30					3	Grade, Exam
7	Databases	60	30		30			5							Exam
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												2	Grade
Subjects for speciality															
11	Designing of the database systems	60							30			30		5	Exam
12	Visual programming	45							15		30			4	Grade
13	System Techniques Basics	60	30					2			30			2	Grade
14	Computer management systems	30							30					2	Grade
Overall hours/ECTS credits			**180**	**90**	**120**	**0**	**0**	**30**	**180**	**60**	**105**	**30**	**0**	**30**	
Overall hours in semester (year) without practice		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer system and networks **Stationary**
Recruitment: 2007

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				2	G, E
Field subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	60							30			15	15	4	Exam
5	Methods of artificial intelligence	90	30		30			4					30	2	E, G
6	Practice	200												2	Grade
Subjects for speciality															
7	Mobile systems	45	15			30		3							Grade
8	UNIX administration	30			30			2							Grade
9	Administration of Windows 2003	30									30			2	Grade
10	Selected Aspects of Computer Networks	60	30				30	6							Exam
11	Foundation of Computer Simulation	60							30		30			5	Exam
12	Diploma seminar	45					15	2					30	2	Grade
13	Monographic A	60	30				30	5							Grade
14	Monographic B	60							30				30	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**30**	**75**	**30**	**75**	**30**	**90**	**30**	**60**	**15**	**135**	**30**	
Overall hours in semester (year) without practice		**705**	**375**						**330**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Computer systems and networks design	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours :		**150**	**150**						

Overall hours – 2310

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2007

Year I

No.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	36	24				5							Exam
3	Physics for engineers	48	24		24			5							Grade
4	Introduction to technique	24	24					5							Grade
5	Discrete mathematics	60							36	24				5	Exam
6	Electronics and metrology - basic principles	48							24	24				6	Exam
Field subjects															
7	Fundamentals of law in informatics	24	12	12				2							Grade
8	Law aspects of IT market	24							12	12				2	Grade
9	Introduction to Computer Engineering	24	12	12				5							Exam
10	Fundamentals of programming I	48	24		24			6							Grade
11	Fundamentals of programming II	48							24		24			6	Grade
12	Algorithms and data structures	24							12		12			6	Exam
13	Fundamentals of computer graphics	24							12		12			3	Grade
Overall hours/ECTS credits			**162**	**48**	**48**	**0**	**0**	**30**	**150**	**60**	**48**	**0**	**0**	**30**	
Overall hours in semester (year)		**516**	**258**						**258**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2007

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of Credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				1	Grade
2	Physical education	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	36	24				6							Exam
4	Fundamentals of information theory	12							12					2	Grade
Field subjects															
5	Object-oriented design and programming	48	12		12			5	12		12			3	Grade
6	Computer Networks	60	12		24			5	24					4	Grade, Exam
7	Databases	36	24		12			6							Exam
8	Computer architecture	36	24		12			5							Exam
9	Operating Systems	36							24		12			5	Exam
10	Practice	200												2	Grade
Subjects for speciality															
11	Designing of the database systems	36							24			12		5	Exam
12	Visual programming	24							12		12			4	Grade
13	System Techniques Basics	36	24					2			12			2	Grade
14	Computer management systems	12							12					2	Grade
Overall hours/ECTS credits			**132**	**84**	**60**	**0**	**0**	**31**	**120**	**60**	**48**	**12**	**0**	**31**	
Overall hours in semester (year) without practice		**516**	**276**						**240**						

Major: Information technology
Specialization: Computer system and networks **Non-stationary**
Recruitment: 2007

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				2	G, E
Field subjects															
2	Designing and implementing information systems	36	12					2					24	2	Grade
3	Microprocessor techniques and embeded systems	24	12		12			3							Grade
4	Security of information systems	36							12			12	12	5	Exam
5	Methods of artificial intelligence	48	12		12			4					24	2	E, G
6	Practice	200												2	Grade
Subjects for speciality															
7	Mobile systems	24	12			12		3							Grade
8	UNIX administration	24			24			2							Grade
9	Administration of Windows 2003	24									24			2	Grade
10	Selected Aspects of Computer Networks	48	24				24	6							Exam
11	Foundation of Computer Simulation	48							24		24			5	Exam
12	Diploma seminar	36					12	2					24	2	Grade
13	Monographic A	36	24				12	5							Grade
14	Monographic B	36							24				12	5	Grade
15	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**96**	**30**	**48**	**12**	**48**	**30**	**60**	**30**	**48**	**12**	**96**	**31**	
Overall hours in semester (year) without practice		**480**	**234**						**246**						

Year IV

Lp.	Course name	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Subjects for speciality									
1	Diploma seminar	24					24	2	Grade
2	Team Project	24			24			7	Grade
3	Computer systems and networks design	24			24			7	Grade
4	Monographic C	36	24				12	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**24**	**0**	**48**	**0**	**36**	30	
Overall hours :		**108**	**108**						

Overall hours – 1704

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2007

Year I

Lp.	Course name	Hours	Semester 1					ECTS	Semester 2					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Humanistic subject to choose	60	30					2	30					2	Grade
Basic subjects															
2	Mathematical analysis and linear algebra	60	30	30				5							Exam
3	Physics for engineers	60	30		30			5							Grade
4	Introduction to technique	30	30					5							Grade
5	Discrete mathematics	60							30	30				5	Exam
6	Electronics and metrology - basic principles	60							30	30				6	Exam
Field subjects															
7	Fundamentals of law in informatics	45	30	15				2							Grade
8	Law aspects of IT market	45							30	15				2	Grade
9	Introduction to Computer Engineering	60	30	30				5							Exam
10	Fundamentals of programming I	60	30		30			6							Grade
11	Fundamentals of programming II	60							30		30			6	Grade
12	Algorithms and data structures	60							30		30			6	Exam
13	Fundamentals of computer graphics	30							15		15			3	Grade
Overall hours/ECTS credits			**210**	**75**	**60**	**0**	**0**	**30**	**195**	**75**	**75**	**0**	**0**	**30**	
Overall hours in semester (year)		**690**	**345**						**345**						

Industrial Safety – I semester 4h
Library training - I semester 4h

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2007

Year II

Lp.	Course name	Hours	Semester 3					ECTS	Semester 4					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	Physical education	60		30				1		30				1	Grade
2	English	60		30				1		30				1	Grade
Basic subjects															
3	Fundamentals of probabilistic and statistics methods	60	30	30				6							Exam
4	Fundamentals of information theory	30							30					2	Grade
Field subjects															
5	Object-oriented design and programming	90	30		30			5	15		15			3	Grade
6	Computer Networks	90	30		30			5	30					3	G, E
7	Databases	60	30		30			5							Exam
8	Computer architecture	60	30		30			5							Exam
9	Operating Systems	60							30		30			5	Exam
10	Practice	200												2	Grade
Subjects for speciality															
11	Multimedia presentations	30	15		0	15		2							Grade
12	Visual programming	45							15		30			4	Grade
13	Advanced methods of computer graphics	60							30		30			6	Exam
14	Fundamentals of plastic compositions	60							15	30	15			3	Grade
Overall hours/ECTS credits			**165**	**90**	**120**	**15**	**0**	**30**	**165**	**90**	**120**	**0**	**0**	**30**	
Overall hours in semester (year) without practice		**765**	**390**						**375**						

Major: Information technology
Specialization: Computer graphics **Stationary**
Recruitment: 2007

Year III

Lp.	Course name	Hours	Semester 5					ECTS	Semester 6					ECTS	Form of credit
			lc	c	l	p	s		lc	c	l	p	s		
Subjects of general education															
1	English	60		30				1		30				2	G,E
Field subjects															
2	Designing and implementing information systems	60	30					2					30	2	Grade
3	Microprocessor techniques and embeded systems	45	30		15			3							Grade
4	Security of information systems	60							30			15	15	4	Exam
5	Methods of artificial intelligence	90	30		30			4					30	2	E, G
6	Practice	200												2	Grade
Subjects for speciality															
7	Advanced methods of computer graphics	30		30				3							Grade
8	Mobile systems	45	15			30		3							Grade
9	Graphics programs and DTP	105	30		30			5	15		30			4	E, G
10	Digital assembly of multimedia files	30			30			2							Grade
11	Technical drawing and AUTO-CAD	75							30	15	30			5	Exam
12	Monographic A	60	30				30	5							Grade
13	Monographic B	60							30				30	5	Grade
14	Diploma thesis	0						2						4	Grade
Overall hours/ECTS credits			**165**	**60**	**105**	**30**	**30**	**30**	**105**	**45**	**60**	**15**	**105**	**30**	
Overall hours in semester (year) without practice		**720**	**390**						**330**						

Year IV

Lp.	Nazwa przedmiotu	Hours	Semester 7					ECTS	Form of credit
			lc	c	l	p	s		
Przedmioty specjalnościowe									
1	Diploma seminar	30					30	2	Grade
2	Team Project	30			30			7	Grade
3	Design of graphics applications	30			30			7	Grade
4	Monographic C	60	30				30	5	Grade
5	Diploma thesis	0						9	Grade
Overall hours/ECTS credits			**30**	**0**	**60**	**0**	**60**	30	
Overall hours :		**150**	**150**						

Overall hours – 2325

Subjects of general education:

ECTS credits
2

1. Course title

Regional history (The region and the regionalism on example of the Lower Silesia)

2. Course contents

Lecture

Territorial development of Silesia on space of histories
Silesia till year 1138
Silesia in summers 1138-1335
Silesia in Czech monarchy 1335-1526
Habsburski Silesia 1526-1741
Prussian Silesia 1741-1918
Silesia in summers 1918-1945
Silesia after 1945 year

3. Prerequisites

None

4. Learning outcomes

Student is familiar with the history of Silesia in the background of state organisms, to which this area belonged. The chronological scope encompasses all of history to 1989.

5. Recommended reading

1. Czapliński M. i inni, *Historia Śląska*, Wrocław 2007 (lub wyd. 2002).
2. Harasimowicz J., *Dolny Śląsk*, Wrocław 2007.
3. *Historia chłopów śląskich*. Opracowanie zbiorowe pod redakcją Stefana Inglota, Warszawa 1979.
4. Kaczmarek M. i inni, *Wrocław. Dziedzictwo wieków*, Wrocław 1997.
5. Boras Z., *Książęta piastowscy Śląska*, Katowice 1978.
6. Dola K., *Dzieje Kościoła na Śląsku*, część I. *Średniowiecze*, Opole 1996.
7. Drabina J., *Miasta śląskie w średniowieczu*, Katowice 1987.
8. *Legnica. Zarys monografii miasta* pod redakcją Stanisława Dąbrowskiego, Wrocław-Legnica 1998.
9. Mandziuk J., *Historia Kościoła katolickiego na Śląsku. Czasy reformacji protestanckiej, reformy katolickiej i kontrreformacji 1520-1742*. Tom 2, Warszawa 1995.

6. Type of course

Optional

7. Teaching team

Department of Tourizm

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/30	I	1
Classes			
Laboratory			
Project			
Seminar			
Other			
Total student's workload	60		

9. Assessment methods

The lecture - the written relating the histories of Silesia work

10. Language of instruction

Polish

ECTS credits
2

1. Course title

Social Communication

2. Course contents

Lecture

Communication as a process. The idea of communication. The initial concepts and definitions. The basic models of the communication by D. McQuail. The interpersonal communication. Main theories and models of interpersonal communication. Verbal and non-verbal aspects of communication. The forms of verbal communication. The sorts of non-verbal communications. The relation between verbal and non-verbal communication. The barriers of the social communication .The main systems of social communication and its specific role .The system of institutional communication . The mass communication - its features and functions. The basis rules of the mass media The transformations of the media system in Poland. The main techniques and mechanisms of the commercial, public relations. The creating of the personal image.

3. Prerequisites

none

4. Learning outcomes

A Student is able to define the basic elements and categories of the social communication and to understand the significant aspects of the communication and the essential issues of the media and cooperation with media as well.

5. Recommended reading

1. Adamowski J.(red.), *Media w państwie współczesnym*, Warszawa 2001.
2. Cianciara J., Uścińska B., *Komunikacja społeczna. Komunikowanie się z mediami w praktyce*, Wrocław 1999.
3. Dobek-Ostrowska B., *Podstawy komunikowania społecznego*, Wrocław 2004.
4. Dobek-Ostrowska B. (red.), *Współczesne systemy komunikowania*, Wrocław 1998.
5. Goban-Klas T., *Media i komunikowanie masowe. Teorie i analizy prasy, radia, telewizji i Internetu*, Warszawa-Kraków 2004.
6. Ociepka B., *Komunikowanie międzynarodowe*, Wrocław 2002.
7. Olędzki J., *Komunikowanie w świecie*, Warszawa 2001.
8. Rozwadowska B., *Public relations. Teoria. Praktyka. Perspektywy*, Warszawa 2002.
9. Stankiewicz J. *Komunikowanie się w organizacji*, Wrocław 1999.

6. Type of course

Facultative.

7. Teaching team

Department of Sociology and Social Communication

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/30	I	1
Classes			
Laboratory			
Project			
Seminar			
Other			
Total student's workload	60		

9. Assessment methods:

Lecture – written test

10. Language of instruction:

Polish

ECTS credits
2

1. Course title:
Sociology

2. Course contents:
The place of sociology among other social sciences. The subject and functions of general and specific sociology. Natural, economical and cultural considerations of social life. Mass culture and its influence on social and work processes. Cultural diffusion and cultural heritage as factors of social and economical development. The man vs. social environment. Sociological model of man. The question of personality in social sciences. Work vs. personality. Economic mentality of the individual vs. their participation in economic and social processes. Socio-psychological characteristics of relations and relationships: needs – motivations – bases – behaviors. Social bonds as the basis for the emerging of social groups. Public institutions and their functions. Characteristics of total institutions. Social norms and values as the elements of the social organization of the group. Most important groups in the life of the individual. Characteristics of the basic social processes (adaptation, cooperation, conflict, disorganization, social mobility). Social problems of the Polish society in the period of political transformation. Research in social development. Elements of chosen theories of social development (Plato, Condorcet, Turgot, Popper). Social stratification (social classes). The society and its sociopolitical organization. Nation as a group having the features of a community. Nation and other contemporary ethnic groups. Bureaucracy in modern social institutions. Development of self-government institutions during transformation. Basic methods and techniques of sociological research.

3. Prerequisites
None

4. Learning outcomes
Student is aware of the complexity of the social reality, consisting of social groups, institutions, processes and phenomena. Student is familiar with methods and techniques of sociological research and therefore has the opportunity of getting to know this reality. Student knows the possibility of using sociological knowledge in other social sciences.

5. Recommended reading
1. B. Szacka, *Wprowadzenie do socjologii.* Warszawa, OW 2003
2. P. Sztompka *Socjologia. Analiza społeczeństwa.* Kraków, ZNAK 2002
3. Z. Polakowska-Kujawa (editor) *Socjologia ogólna.* SGH, Warszawa 1999

6. Type of the course
Optional

7. Teaching Team
Department of Sociology and Public Communication

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/30	II	1
Classes			
Laboratory			
Project			
Seminar			
Other			
Total student's workload	60		

9. Assessment methods
Term assignments and coursework

10. Language of instruction
Polish

ECTS credits
2

1. Course title:
Psychology
2. Course contents

- The main concepts of psychology
- Cognition; perception, attention, memory, creative thinking, intelligence
- Emotion and motivation
- Personality
- The social behaviour; self-presentation, group behaviour, cognitive dissonance, groupthink
- Human communication and influance on people

3. Prerequisites:
None
4. Learning outcomes:
Student is familiar with the basic psychological themes and terminology, so that in the future he/she can use the texts and training materials on the psychological aspects of motivation, human resources management, etc**.**
5. Recommended reading

1. Strelau, J. red. (2002) *Psychologia. Podręcznik akademicki.* t.1-2. Gdańsk: Gdańskie Wydawnictwo Psychologiczne.
2. Cialdini, R. (1996) *Wywieranie wpływu na ludzi.* Gdańsk. Gdańskie Wydawnictwo Psychologiczne.
3. Robbins, S. (2000) *Zasady zachowania w organizacji.* Poznań: Zyski i S-ka Wydawnictwo.

6. Type of course:
Obligatory
7. Teaching team:
Department of Sociology and Public Communication
8. Course structure

Form	Number of hours	Semester	year
Lecture	30/30	II	1
Classes			
Laboratory			
Project			
Seminar			
Other			
Total student's workload	60		

9. Assessment methods:
Test of knowledge
10. Language of instruction:
Polish

ECTS credits
1

1. Course title
English
2. Course contents
Thematic scope of the course:

1. Autopresentation , telling about yourself in the professional context, about your future career ambitions, interests, contemporary world./ 4 hours
2. Earning a Living. / 8 hours
2.1 Wages and living standards.
2.2 Job roles and types- agriculture, industry, services.
2.3 Applying for a job. Job interviews.
2.4 Employer/ employee relationships.
3. Business correspondence. Practising writing memos. / 6 hours
4. Production and Sale of Goods and Services. / 8 hours
4.1 Distribution: orgin and destination of product.
4.2 Retail and wholesale outlets: competition between small shops and supermarkets.
4.3 New markets and products.
4.4 Quality and customer service.

3. Prerequisites
none
4. Learning outcomes
The student acquires language abilities at one of the levels (A1-B2), needed in the cooperation with foreign business partners in the field of Business English taking into account preparation and practice for LCCI English for Business exams (preliminary level, level 1, level 2, level 3). The student acquires sufficient language competence to communicate easily in various business contexts.
5. Recommended reading

1. *How to Pass English for Business Second Level*. The Official LCCI Examinations Board Guide.
2. Trappe, T., G. Tullis and Ch. Johnson. 2005. *Intelligent Business Intermediate.* Longman.
3. Sweeney, S. 2000. Business English. *Marketing.* Longman.
4. Flinders, S. 2000. Business English. *Intermediate.* Longman.
5. McKellen, J.S. 2000. Business English. *General Usage.* Longman.
6. Viney, P. and K. Viney. 1997. *Handshake. A Course In Communication*. Oxford University Press.
7. Comfort, J. 1995. *Speaking Effectively*. Cambridge University Press.

6. Type of course
Obligatory
7. Teaching team
Teachers of English.
8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes	30	III	2
Laboratory			
Project			
Seminar			
Other			
Total student's workload	30		

9. Assessment methods:
tutorials
10. Language of instruction:
Polish

ECTS credits
1

1. Course title
English
2. Course contents
Thematic scope of the course:

1. Business correspondence. Practising writing company leaflets. / 6 hours
1.1 Exam task. Basic reading comprehension: true-or-false questions. Practice.
(On the basis of the materiale of LCCI Examinations Board, *How to Pass English for Business First Level)*
2. International Trade. / 8 hours
2.1 Description of imports/exports.
2.2 Changes in international markets.
2.3 Economic problems in developing countries.
2.4 Trade blocks e.g. EU, ASEAN, NAFTA.
3.Business correspondence. Practising writing business reports. /8 hours
3.1 Exam task.. Information processing: short-answer questions. Practice.
(On the basis of the materiale of LCCI Examinations Board, *How to Pass English for Business First Level)*
4. Money. / 8 hours
4.1 Methods of paying/ purchasing.
4.2 Inflation and price changes.
4.3 Banking services.
4.4 Savings and investment.

3. Prerequisites
none
4. Learning outcomes
The student acquires language abilities at one of the levels (A1-B2), needed in the cooperation with foreign business partners in the field of Business English taking into account preparation and practice for LCCI English for Business exams (preliminary level, level 1, level 2, level 3). The student acquires sufficient language competence to communicate easily in various business contexts.
5. Recommended reading

1. *How to Pass English for Business Second Level*. The Official LCCI Examinations Board Guide.
2. Trappe, T., G. Tullis and Ch. Johnson. 2005. *Intelligent Business Intermediate*. Longman.
3. Sweeney, S. 2000. Business English. *Marketing.* Longman.
4. Flinders, S. 2000. Business English. *Intermediate.* Longman.
5. McKellen, J.S. 2000. Business English. *General Usage.* Longman.
6. Viney, P. and K. Viney. 1997. *Handshake. A Course In Communication*. Oxford University Press.
7. Comfort, J. 1995. *Speaking Effectively*. Cambridge University Press.

6. Type of course
Obligatory
7. Teaching team
Teachers of English.
8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes	30	IV	2
Laboratory			
Project			
Seminar			
Other			
Total student's workload	30		

9. Assessment methods:
written test
10. Language of instruction:
Polish

ECTS credits
1

1. Course title
English
2. Course contents
Thematic scope of the course:

1. Transport / 8 hours
1.1 Types of transport in Poland
1.2 Transport for the individual
1.3 Transport for commerce and industry
1.4 Local infrastructure for: road, rail, sea and air transport
2. Basic reading comprehension: interpreting short information, providing one-word answers /6 hours.
(On the basis of LCCI Examinations Board materials, *How to Pass English for Business First Level)*
3. Communications/8 hours
3.1 Media: TV, newspapers, Internet, advertising
3.2 Information Technology: computers
3.3 Communications: telephone, faz, e-mail
4. Business correspondence: letter writing practice/ 8 hours

3. Prerequisites
none
4. Learning outcomes
The student acquires language abilities at one of the levels (A1-B2), needed in the cooperation with foreign business partners in the field of Business English taking into account preparation and practice for LCCI English for Business exams (preliminary level, level 1, level 2, level 3). The student acquires sufficient language competence to communicate easily in various business contexts.
5. Recommended reading

1. *How to Pass English for Business Second Level*. The Official LCCI Examinations Board Guide.
2. Trappe, T., G. Tullis and Ch. Johnson. 2005. *Intelligent Business Intermediate.* Longman.
3. Sweeney, S. 2000. Business English. *Marketing.* Longman.
4. Flinders, S. 2000. Business English. *Intermediate.* Longman.
5. McKellen, J.S. 2000. Business English. *General Usage.* Longman.
6. Viney, P. and K. Viney. 1997. *Handshake. A Course In Communication*. Oxford University Press.
7. Comfort, J. 1995. *Speaking Effectively*. Cambridge University Press.

6. Type of course
Obligatory
7. Teaching team
Teachers of English.
8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes	30	V	3
Laboratory			
Project			
Seminar			
Other			
Total student's workload	30		

9. Assessment methods:
written test
10. Language of instruction:
Polish

ECTS credits
2

1. Course title
English
2. Course contents
Thematic scope of the course:

1. Education / 8 hours
1.1 Personal education
1.2 The education system
1.3 Training and skills
2. Basic reading comprehension: interpreting chart and graph data , providing one-word answers /8 hours. (On the basis of LCCI Examinations Board materials, *How to Pass English for Business First Level)*
3. Travel and Tourism/ 8 hours
3.1 The importance of travel to the individual
3.2 Tourism and the local area
3.3 Tourism in a nation's economy
4. Revision Practice before final written and oral examination/6 hours

3. Prerequisites
none
4. Learning outcomes
The student acquires language abilities at one of the levels (A1-B2), needed in the cooperation with foreign business partners in the field of Business English taking into account preparation and practice for LCCI English for Business exams (preliminary level, level 1, level 2, level 3). The student acquires sufficient language competence to communicate easily in various business contexts.
5. Recommended reading

1. *How to Pass English for Business Second Level*. The Official LCCI Examinations Board Guide.
2. Trappe, T., G. Tullis and Ch. Johnson. 2005. *Intelligent Business Intermediate.* Longman.
3. Sweeney, S. 2000. Business English. *Marketing.* Longman.
4. Flinders, S. 2000. Business English. *Intermediate.* Longman.
5. McKellen, J.S. 2000. Business English. *General Usage.* Longman.
6. Viney, P. and K. Viney. 1997. *Handshake. A Course In Communication*. Oxford University Press.
7. Comfort, J. 1995. *Speaking Effectively*. Cambridge University Press.

6. Type of course
Obligatory
7. Teaching team
Teachers of English.
8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes	30	VI	3
Laboratory			
Project			
Seminar			
Other			
Total student's workload	60		

9. Assessment methods:
Written test, written and oral examination
10. Language of instruction:
Polish

ECTS credits
0

1. Course title

Physical Education

2. Course contents

All the physical activities are offered to be for students at the gym, sports hall, fitness room and on the swimming pool. The students have the opportunities to choose their preferable form.

3. Prerequisites

There are not observed any bad impact on their health.

4. Learning outcomes

The aim of the course is to improve the physical activity of the students and their knowledge connected with practicing sports, especially sophisticated exercises. The subject has to have an impact on their physical education in this direction. It is crucial for them to get significant facilities, experience and also all the important skills during realizing such a broadminded course. It is significant in their future to reach all their aims in work to be as animators or the main organizers of the physical activities in their surrounding as the course contains all the important issues in the branch of physical education. Teaching how to relax, how to reach the essential discipline in different sports are not the only aspects of this vital course.

5. Recommended reading

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6. Type of course

Obligatory

7. Teaching team

Department of Recreation

8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes	30	III	2
Laboratory			
Project			
Seminar			
Other			
Total student's workload	30		

9. Assessment methods:

Unrated credits (without a grade) based on attendance in class

10. Language of instruction:

Polish

ECTS credits
0

1. Course title

Physical Education

2. Course contents

All the physical activities are offered to be for students at the gym, sports hall, fitness room and on the swimming pool. The students have the opportunities to choose their preferable form.

3. Prerequisites

There are not observed any bad impact on their health.

4. Learning outcomes

The aim of the course is to improve the physical activity of the students and their knowledge connected with practicing sports, especially sophisticated exercises. The subject has to have an impact on their physical education in this direction. It is crucial for them to get significant facilities, experience and also all the important skills during realizing such a broadminded course. It is significant in their future to reach all their aims in work to be as animators or the main organizers of the physical activities in their surrounding as the course contains all the important issues in the branch of physical education. Teaching how to relax, how to reach the essential discipline in different sports are not the only aspects of this vital course.

5. Recommended reading

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6. Type of course

Obligatory

7. Teaching team

Department of Recreation

8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes	30	IV	2
Laboratory			
Project			
Seminar			
Other			
Total student's workload	30		

9. Assessment methods:

Unrated credits (without a grade) based on attendance in class

10. Language of instruction:

Polish

Basic subjects:

ECTS credits
2

1. Course name

Basics of information theory

2. Course description

Lecture

Introduction.
Basic terms: information, information source, signal.
Entropy of one- and two dimensional discrete random variable.
The average information obtained from a single event and from a single symbol received from noisy digital channel.
Entropy of analog sources. Analog sources digitalization.
Extensions of an information source and their entropy.
Markov sources.
Information coding. Block codes.
The average codeword length and entropy.
The most efficient encoding. Huffman encoding.
Transmission of information, loss function, risk, decision rule.
Decision rule optimization for binary signal receive.

3. Prerequisites

none

4. Learning outcomes

Students are able to: calculate the entropy of one and two dimensional discrete random variable
calculation of the analog signal sampling frequency, encode information, construct Huffman codes, calculate the channel throughput. Calculation of the optimal decision rules for Gaussian additive noise channels.

5. **Literature**

Abramson N., *Teoria informacji i kodowania*, PWN, Warszawa 1989.
Topolewski Z., *Analiza i synteza szyfrowania informacji*, Wrocław WSO 1995.
Imminik K.A.S., *Coding Techniques for Digital Recording*, Prestice Hall, New York 1991.
Schneier B., *Kryptografia dla praktyków*, WNT, Warszawa 1995.

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Networks, Electronics and Telecommunication

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12'	3	2
Classes			
Laboratory			
Project			
Seminar			
Total student's workload	60		

9. **Conditions of the course acceptance**:

colloquium

10. **Language**:

Polish

ECTS credits
5

1. Course name

Discrete mathematics

2. Course description

Lecture

Elements of mathematical logic: logical sentence, tautology, sentential function, quantifiers. Techniques of proofs: direct proof, reductio ad absurdum. Mathematical induction. The algebra of sets: operations on sets, basic properties, Cartesian product. Relations: basic properties, order relations and equivalence relations. Functions: basic properties, operations on functions. Elements of combinatorics: basic notions, Newton's formula, counting methods: the principle of multiple-choice, additivity principle, Dirichlet's box principle, principle of inclusion-exclusion. Recursion theory: linear recurrences of first and higher orders, generating functions. Trees and graphs: basic notions, operations on graphs, planar graphs, directed graphs, coloring graphs. Introduction to Boolean algebra and its applications.

Classes

During the classes students solve some problems from the following areas: mathematical logic, predicate logic, set theory, basic theory of relations and functions, mathematical induction, recursion, combinatorics and graph theory.

3. Prerequisites

Completion of the course "Mathematical analysis and linear algebra".

4. Learning outcomes

The student is able to interpret and define the concept of computer science in terms of functions and relations. He knows how to use: the logic, theorem proving methods, graphs, and recursion theory, Boolean algebra to solve problems on a computer. Able to use the term graph to the need to design a relationship. He knows how to use the phenomenon of recursion, both in descriptive purpose and to solve of a quantitative nature.

Recursion method can solve by using the characteristic equation and the generating function. Understands the role and importance of Boolean algebra in modern computing science. He knows the basic use of Boolean algebras.

5. Literature

1. R. Rębowski, *Matematyka dyskretna dla informatyków*, Seria Wydawnicza PWSZ im. Witelona w Legnicy, 2008.
2. R. Rębowski, J. Płaskonka, *Zbiór zadań z matematyki dyskretnej dla informatyków*, Seria Wydawnicza PWSZ im. Witelona w Legnicy, 2009.
3. K. A. Ross, Ch. R. B. Wright, *Matematyka dyskretna*, PWN, Warszawa, 2006.
4. R. Graham, D. Knuth, O. Patashnik, *Matematyka konkretna*, PWN, Warszawa, 2006.
5. T. Cormen, Ch. Leiserson, R. Rivest, C. Stein, *Wprowadzenie do algorytmów*, WNT, Warszawa, 2004.

6. Type of course

Obligatory.

7. Teaching team

Department of Basic Sciences.

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/36	II	1
Classes	30/24	II	1
Laboratory			
Project			
Seminar			
Total student's workload	150		

9. Conditions of the course acceptance:

Completion of classes and written examination are the conditions of ranking the lecture.

10. Language:

Polish.

ECTS credits
6

1. Course name

Electronics and metrology - basic principles

2. Course description

Lecture

Electric charge, electric and magnetic field. Elements of the electric circuit. General terms and definitions: general classification of circuit elements and their description; Ohm's law; principles of current and voltage arrow placement; circuit diagram, presentation of circuit topology by means of its graph and definition of graph elements such as node, branch, cutset and loop; Kirchhoff's Current Law and Kirchhoff's Voltage Law. Circuit equations. Methods of analysis: mesh current and nodal voltage methods. Thevenin's theorem and Norton's theorem, superposition theorem. Linear circuits, properties, fundamental theorems. Electric energy and power: energy conservation law and power balance; voltage, current and power calculations for simple circuits - practical examples. Circuits in the steady state, DC and AC network analysis. Basic theory and phenomena of semiconductor physics. Theory of p-n junction and diode classification. characteristics and small signal ac analysis of diodes, bipolar and field effect transistors. Equivalent circuits, frequency response and switching parameters. Transistor amplifiers. Use data sheet information and parameter measurement of devices. Frequency response of electronic circuits. Feedback theory. Differential and operational amplifiers and their applications. Active filters. Basic RF amplifiers. Power amplifiers. Oscillator circuits. Linear and switched-mode regulators. Boolean algebra. Introduction to digital electronics. A review of basic relevant properties of BJT and MOSFET for digital electronics. Logic gates. Combinatorial circuits. Flip-flops. Sequential logic. The fundamental basic building blocks for logic. Design and implementation of more complex combinational and sequential logic circuits up to registers and counters. Semiconductor memories. Programmable logic. Design constraints: reliability, performance, area and power consumption. Design for high speed, low power circuits. System design and test. Microprocessors, microcontrollers. Definition of the measurement. Basic concepts of measurement techniques. SI standard.

3. **Prerequisites**

Physics

4. **Aim of the course**

The students understand principles of electromagnetic phenomenon, they can point their application in nowadays computer science. They know fundamentals of electric circuits, electronics elements and devices, their characteristics, limitations, and applications. They can explain how to connect them into big systems.
They understand measurements and can use electronic instrumentation.

5. **Literature**

a. Praca zbiorowa: *Elektrotechnika i elektronika dla nieelektryków*, WNT, Warszawa, 2004 r.
b. U. Tietze, Ch. Schenk: *Układy półprzewodnikowe*, WNT, Warszawa 1997
c. J. Kalisz *Podstawy elektroniki cyfrowej*, WKŁ, Warszawa 1993
d. P. Horowitz, W. Hill *Sztuka elektroniki*, WKŁ, 2002
e. A. Chwaleba, M. Poniński, A. Siedlecki *Metrologia elektryczna*, WNT, Warszawa 2003

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	2	1
Classes	30/24	2	1
Laboratory			
Project			
Seminar			
Total student's workload	180		

9. **Conditions of the course acceptance**:

classes and written test; lecture – exam

10. **Language**:

Polish

ECTS credits
6

1. Course name

Fundamentals of probabilistic methods and statistics

2. Course description

Lecture

Introduction: Introduction to probabilistic methods-Kolmogorov concept of probability space: events space and probability as a set function on a sigma algebra of events. Classification of probabilistic models: discrete, conditional (dependence and independence, conditional probability, Bayes formula). Concept of probability distributions: cumulative distribution function, probability density function. Concept of random variable: discrete and continuous. Distributions and their parameters: mean value, variance (standard deviation) and moments. Examples of probability distributions: binary distribution, binomial distribution, Poisson, uniform distribution, triangular, Gaussian distribution, chi-square, t-Student. Multi-dimensional random variable-concept, joint probability density function and marginal probability density function, parameters of two-dimensional random variable (covariance matrix, correlation). Limit theorems: weak and strong law of large numbers, central limit theorem. Introduction to mathematical statistics: fundamental concepts (sample, random sample, population) and methods of statistical investigations. Empirical cumulative distribution, histogram. Introduction to estimation theory. Statistical inference: hypothesis testing: fundamental concepts (non-parametric tests, hypothesis, first-order and second-order error, level of significance). Examples of significance tests. Statistical tables. Statystical analysis of data on the example of linear regression.

Classes

Solving of computational problems dealing with probability calculus and statistical mathematics: conditional probability, Bayes formula, Bayes decision problems, distributions and parameters of random variables, procedures of estimation, significance test procedures.

3. **Prerequisites**

Mathematics

4. **Learning outcomes**

The student knows methods and tools for formal description and analysis of “uncertainty” to the extent possible the practical application of selected methods of statistical inference, and computer processing of random data. Can use a discrete and continuous distributions. He knows how to determine its basic parameters. Can describe the phenomenon of mass and investigate its characteristics by using the methods of statistical analysis.

5. **Literature**

1. R. Rębowski, *Podstawy metod probabilistycznych*, Seria Wydawnicza PWSZ im. Witelona w Legnicy, 2006.
2. R. Rębowski, J. Płaskonka, *Zbiór zadań z metod probabilistycznych*, Seria Wydawnicza PWSZ im. Witelona w Legnicy, 2008.
3. M. Fisz, *Rachunek prawdopodobieństwa*, PWN Warszawa 1969.
4. W. Krysicki i inni, *Rachunek prawdopodobieństwa i statystyka matematyczna w zadaniach*, część I i II, PWN, Warszawa 1995.

6. Type of course

Obligatory

Teaching team

Department of Basic Science

7. Course structure

Form	Number of hours	Semester	year
Lecture	30/36	III	2
Classes	30/24	III	2
Laboratory			
Project			
Seminar			
Total student’s workload	180		

8. **Conditions of the course acceptance**:

Passed exam is the conditions of ranking the lecture

9. **Language**:

Polish

ECTS credits
5

1. Course name

Introduction to technique

2. Course description

Lecture

Definition of technique and technical systems. Technique and civilization. Professional features of engineer. Mathematics, physics and chemistry role as bases of technical science. Productive process vs technological process. Structure of technological processes. Structure of design and construction process. Computer aided design (CAD). Characteristic of production in different technique branches: building, machine constructing, electrical and electronic engineering, food and chemical engineering. Production automatization and robotization. Part of computerization in productive processes realization: Computer aided manufacturing (CAM), Computer integrated manufacturing (CIM). Exploitation and usage, diagnosis, reliability and monitoring of technical systems. New technique and technology transfer into industry. Technique and technology part in economic progress. Technique and natural environment. Recycling.

3. **Prerequisites**

None

4. **Aim of the course**

The main goal of lecture is transferring of basic knowledge concerning technique and technology and the part they take in civilization and social-economical progress.

5. **Literature**

1. Adamczyk W.: *Inżynieria procesów przemysłowych*. Kraków: Wyd. AE 1988
2. Ashby M.F.: *Dobór materiałów w projektowaniu inżynierskim*. Warszawa: WNT 1998
3. Baruk J.: *Nauka i technika w rozwoju gospodarczym*. Lublin: Wyd. UMCS 1997
4. Durlik I.: *Inżynieria zarządzania. Strategia i projektowanie systemów produkcyjnych*. Cz.1. Strategie organizacji i zarządzania produkcją. Warszawa: AWP Placet 2000
5. Griffin R.W.: *Podstawy zarządzania organizacjami*. Warszawa: WN PWN 2000
6. *Innowacje i transfer techniki w gospodarce polskiej*. Red. A.H. Jasiński. Białystok: Wyd. Uniwersytetu 2000
7. Johansson A.: *Czysta technologia. Środowisko, technika, przyszłość*. Warszawa: WNT 1997
8. Krick E.V.: *Wprowadzenie do techniki i projektowania technicznego*. Warszawa: WNT 1975
9. Kubiński W.: *Wprowadzenie do techniki. Rola i miejsce techniki w gospodarce oraz życiu społecznym.* Kraków: Uczelniane Wyd. Nauk. – Dyd. AGH 2006
10. *Wprowadzenie do projektowania*. Red. A. Baranowski. Warszawa: WN PWN 1998

6. Type of course

Obligatory

7. **Teaching team**

Department of Production Engineering

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	1	1
Classes			
Laboratory			
Project			
Seminar			
Total student's workload	150		

9. **Conditions of the course acceptance**:

Written test.

10. **Language**:

Polish

ECTS credits
5

1. Course title

Mathematical analysis and linear algebra.

2. Course contents

Lecture

Sequences and series of numbers, functional series. Differential calculus of functions of one and several variables. Integral calculus: definite and indefinite integral, applications of definite integrals. Introduction to differential equations and their applications. Matrices, determinants, systems of linear equations and Gauss elimination. Elements of analytical geometry. Groups, rings of polynomials and modular arithmetic.

Classes

Computation methods of limits of sequences, convergence of series. Computation methods of limits of functions. Computations of derivatives of functions. Applications of differential calculus. Computations of definite and indefinite integrals. Simple differential equations. Operations on matrices. Computations of determinants of matrices. Methods of solving systems of linear equations. Distances and angles in the three-dimensional space. Operations on polynomials, zeros of polynomials.

3. Prerequisites

None.

4. Learning outcomes

Student applies the language of mathematical analysis to the description of different problems; uses the methods of rings of polynomials and modular arithmetic; formulates problems in terms of matrices and performs operations on matrices; is able to solve systems of linear equations.

5. Recommended reading

1. K. Selwat, *Wybrane zagadnienia matematyki*, Seria Wydawnicza PWSZ im. Witelona w Legnicy, Legnica, 2009.
2. M. Gewert, Z. Skoczylas, *Analiza matematyczna 1 i 2*, Oficyna Wydawnicza GiS, Wrocław, 2008.
3. T. Jurlewicz, Z. Skoczylas, *Algebra liniowa 1*, Oficyna Wydawnicza GiS, Wrocław, 2008.
4. G.M. Fichtenholz, *Rachunek różniczkowy i całkowy. Tom I*, PWN, Warszawa, 2007.
5. W. Krysicki, L. Włodarski, *Analiza matematyczna w zadaniach*, PWN, Warszawa, 2006.
6. M. Gewert, Z. Skoczylas, *Równania różniczkowe zwyczajne*, Oficyna GiS, Wrocław, 2004.

6. Type of course

Obligatory.

7. Teaching team

Department of Basic Sciences.

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/36	I	1
Classes	30/24	I	1
Laboratory			
Project			
Seminar			
Other			
Total student's workload	150		

9. Assessment methods:

Lecture - written examination, classes - credit on the basis of written tests

10. Language of instruction:

Polish.

ECTS credits
5

1. Course title

Physics for engineers

2. Course contents

Lecture: INTRODUCTION: Physics as a natural science. SI – International System of Units. Rudiments of vector calculus. Foundations of analysis of experimental results: measurement and uncertainty, types of error, error analysis. MECHANICS: Material point kinematics. Dynamics of the material point. Newton's Laws of Dynamics, Rigid body dynamics (rotary motion): torque, moment of inertia, law of parallel axis, angular momentum. Work, power and energy. Laws of conservation of momentum, angular momentum and energy. Statics. Gravitation: lines of forces, potential of gravitational field. FLUID MECHANICS: Hydrostatics: Hydrodynamics of the ideal fluid: equation of continuity of flow, Bernoulli's theorem, Magnus effect. Real fluids: viscosity, Stokes formula, Hagen-Poiseuille formula, Reynolds number. THERMAL PHYSICS: Kinetic theory of heat: temperature, zero law of thermodynamics, heat, specific heat. Thermostatics: heat balance. First law of thermodynamics. Equation of state of ideal gas, ideal gas laws. Second law of thermodynamics: reversible and irreversible processes, entropy, heat engines, Carnot cycle. ELECTRICITY AND MAGNETISM: Electrostatics: electric charge, law of conservation of electric charge, Coulomb's law, electric field, potential and electric tension, dielectric properties of matter. Electric current: charge carriers, current strength, electric resistance, Ohm's laws, electromotive force, Kirchhoff's laws, Joule effect. Magnetic field: Lorentz force, induction and magnetic field strength, magnetic properties of matter. Electromagnetic induction: Faraday law, Lenz law, self-inductance. INTRODUCTION TO THE MODERN PHYSICS AND TECHNOLOGY.

Laboratory: Measurement of the moment of inertia using the pendulum method and verification of the parallel axis theorem, Measurement of the modulus of stiffness using the dynamic method, Measurement of the speed of sound using the Lissajous figures, Measurement of the dynamic viscosity using the Stokes method, Calibration of a thermocouple, Measurement of the groove period of a diffraction grating, Measurement of the focal length of lenses using the Bessel method, Spectral analysis – gas spectra, Measurement of electric resistance, Verification of the Ohm's Law for the alternating current, Measurement of the resonance frequency of an RLC circuit, Oscilloscope as a measuring device.

3. **Prerequisites**

none

4. **Learning outcomes**

Student is able to make use of laws and methods of general physics in order to explain physical phenomena and fundamentals of modern technology. This kind of knowledge is supposed to be a basis for other courses. He knows and is capable of using the units of measurements from the International System and is able to present numerical results of measurements in the correct form. He can also estimate the measurement uncertainty.

5. **Recommended reading**

1. J. Orear; *Fizyka*; WNT, Warszawa; (podręcznik podstawowy);
2. H. Szydłowski; *Niepewności w pomiarach. Międzynarodowe standardy w praktyce*, Wydawnictwo Naukowe UAM, Poznań;
3. P.Wilk, W.Urbanik, I.Szczygieł; *Fizyka – laboratorium*, Wyd. Akademii Ekonomicznej, Wrocław.

6. Type of course

Obligatory

7. **Teaching team**

Department of Basic Sciences

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/24	I	1
Classes			
Laboratory	30/24	I	1
Project			
Seminar			
Other			
Total student's workload	150	I	1

9. **Assessment methods**:

Laboratory –obligatory number of accomplished experiments (positively graded),
Written test is the conditions of ranking the lecture.

10. **Language of instruction**:

Polish

Main subjects:

ECTS credits
6

1. Course title

Algorithms and data structures

2. Course description

Lecture

1. Introduction. Basic definition. Methods of algorithms representation.
2. Basic programming structures.
3. Computational complexity of algorithms.
4. Basic data types: arrays, structures.
5. Complex data types: file, pointer.
6. Recursive algorithm. A derecursivation process. Some case studies of recursion.
7. Sorting algorithms: bubblesort, isertionsort, selectionsort, quicksort, heapsort, mergesort
8. Dinamic data structures: methods of creation and manipulation.
9. Trees: types, creation methods, basic operation, practice.
10. Algorithms of text pattern searching.
11. Graphs: methods of representation in memory, path searching methods.
12. Graphic and geometry algorithms.

Laboratory

Implementation of the proposed algorithms using C or Pascal programming languages

3. **Prerequisites**

none

4. **Learning outcomes**

Students will be able to solve the problem of algorithms construction, evaluation and optimalisation and present some methods of data structures computation and programming.

5. **Literature**

1. Silberschatz A., Peterson J.L., Galvin P.B., *Podstawy systemów operacyjnych*, WNT Warszawa1993
2. Bach M.J., *Budowa systemu operacyjnego UNIX*, WNT, Warszawa 1995
3. Lister A.M., Eager R.D., *Wprowadzenie do systemów operacyjnych*, WNT Warszawa 1994
4. Kerningham B.W., Ritchi D.M., *Język C*, WNT, Warszawa 1988

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12	2	1
Classes			
Laboratory	30/12	2	1
Project			
Seminar			
Total student's workload	180		

9. **Conditions of the course acceptance**:

laboratory and written test are the conditions of ranking the lecture

10. Language of instruction

Polish

ECTS credits
5

1. Course title

Computer architecture

2. Course contents

Lecture

Information representation, coding, elements state and two-state systems notation, binary strings, hexadecimal form, integer numerical data, addition/subtraction operations (sign-magnitude code, 1's complement and 2's complement codes). Floating-point numbers notation, IEEE 754 standard. Decimal numbers coding (BCD code). Alphanumeric marks coding (ASCII code, even parity bit). Computer description levels: realization (electronic), structure (logical), architecture. Laminar model of computer system; computer language and operating system notions. Functional blocks of computer (von Neumann's model); information flows in instruction cycle, control information and data. Simple didactical computer architecture example. Central processing unit architecture. Role of accumulator (register), instruction counter, stack and state markers index. Instruction formats example. Instruction set, instruction function and computer logical structure dependence, CISC and RISC conception. Interruptions system, programs switching mechanism, role of system's stack, priorities, masking, programmable interruptions. External transmission; comparison of programmable transmission, interruptions control and out of processors transmission (DMA). Memory hierarchy in computer system. "Cache" memory.

3. **Prerequisites**

Credit for a course "Introduction to the computer engineering"

4. **Learning outcomes**

The main goal of the course is presentation of fundamental characteristics of computer architecture and computer logical organization. The goal of the course is presentation of instructions coding, instruction word structure and operands addressing modes.

5. **Recommended reading**

- Biernat J., *Architektura komputerów*, Oficyna Wydawnicza PWr, Wrocław 2001.
- Koronkiewicz P., *Alchemia PC*, Wyd. Croma, Wrocław 1996.
- Morris Mano M., *Architektura komputerów*, WNT, Warszawa 1988.
- Skorupski A., *Podstawy budowy i działania komputerów*, WKiŁ, Warszawa 1996.

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Networks, Electronics and Telecommunication

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	3	2
Classes			
Laboratory	30/24	3	2
Project			
Seminar			
Total student's workload	150		

9. **Assessment methods**

Lecture – examination.

10. **Language of instruction**

Polish

ECTS credits
5

1. Course name

Computer Networks 2

2. Course description

Lecture

Classification of computer networks, computer networks architecture, standardization organizations, types of commutation, basics of data transmission, wide area networks: structure and architecture, link layer protocol HDLC, connecting of asynchronous users, network protocols X.25, FR and TCP/IP, buffers in network nodes, routing rules, routing protocols. Upper layers protocols (FTP, HTTP, and DNS). Connecting of local area networks over wide area networks, designing of wide area networks.

3. Prerequisites

passing "Computer network 1"

4. Aim of the course

Students are able to: specify the features of local, metropolitan and wide area networks, describe the structure of wide area network, specify the standardization organizations supporting computer networks, describe in details the structure and functions of layers in ISO/OSI and TCP/IP network models, specify and describe types of commutation in computer networks, describe the basics of data transmission, specify and describe network protocols (HDLC, X.25, FR and TCP/IP), describe the structure of wide area network node and specify the functions of its components, explain the rules of routing methods and routing algorithms, calculate the length of path according to RIP and OSPF protocols, specify the advantages and drawbacks of routing protocols, recommend the routing protocol for computer network in dependency on the size and complexity of the network, design the IP addressing scheme for the subnetwork, define and solve basic problems of wide area network designing and optimizing.

5. Literature

Nunemacher G., *Przewodnik po sieciach lokalnych*, MIKOM, Warszawa, 1996
Simmonds A., *Wprowadzenie do transmisji danych*, WkiŁ, Warszawa, 1999
Woźniak J., Nowicki K., *Sieci LAN, MAN i WAN – protokoły komunikacyjne*, Wydawnictwo Fundacji Postępu Telekomunikacji, Kraków, 1998
Kasprzak A., *Rozległe sieci komputerowe z komutacją pakietów*, Wyd. II popr. Oficyna Wyd. PWr., Wrocław 1999.
Comer D. E., *Sieci komputerowe i intersieci*, WNT, Warszawa, 2001.
Tanenbaum A. S., *Sieci komputerowe*, Helion, Gliwice, 2004.
Hassan M., Jain R., *Wysoko wydajne sieci TCP/IP*, Helion, Gliwice, 2004.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Networks, Electronics and Telecommunication

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	4	2
Classes			
Laboratory			
Project			
Seminar			
Total student's workload	150		

9. Conditions of the course acceptance:

written test is the conditions of ranking the lecture

10. Language:

Polish

ECTS credits
6

1. Course title

Databases

2. Course description

Lecture

Introduction, databases definition. Features of modern databases. Data models. Introduction to Relational Databases. Database Management System, structure and activities. SQL language: DDL sublanguage (Data Definition Language) – specifying relation type, database scheme, views, indexes; DML sublanguage (Data Manipulation Language) – simple queries, join operations, aggregation over Data, nested queries, updating existing Data, inserting data, deleting Data, triggers, functions and stored procedures; access control. Creating of Database scheme – design with relational normalization theory. Conceptual modeling of Databases with Entity-Relationship Diagrams. Optimizing DBMS performance. Data security.

Laboratory

Practical exersices of SQL queries computation, entity-relational diagrams design using Sybase PowerDesigner tools, phisical database schema generation, user graphical interface design for database performance tasks.

3. **Prerequisites**

none

4. **Learning outcomes**

The main goal of the lecture is the introduction to the concept of relational database systems, database designing, implementing, and optimizing.

5. **Literature**

1. Hector Garcia Molina, Jeffrey Ullman, Jenifer Widom., *Systemy Baz Danych*, WNT, Warszawa, 2006
2. P. Beynon – Davies, *Systemy baz danych*, WNT, Warszawa, 2003
3. Iwona Poźniak – Koszałka., *Relacyjne bazy danych w środowisku Sybase*, WPWR, Wrocław, 2004

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	3	2
Classes			
Laboratory	30/24	3	2
Project			
Seminar			
Total student's workload	180		

9. **Conditions of the course acceptance**:

Written test is the condition of ranking the lecture

10. **Language**:

Polish

ECTS credits
2

1. Course title

Designing and implementing information systems 1

2. Course description

Lecture

The main goals of course are connected with software project management. Introducing computer systems into the company and its maintaining are described. The client and designer view of project are shown. Problem of creating documentation of tender and agreement of inducting software and hardware solution into the company are presented. Evaluation criteria of proposals are proposed.

Methods of estimating necessary resources are described. Project team designing, role of project manager are mentioned. Methods of quality planning, risk and changes management are described.

3. **Prerequisites**

none

4. **Learning outcomes**

Knowledge of computer project management, risk management, project quality planning, teamwork, project cost estimation, project life cycle, project methodology.

Abilities: revising project of software, designing of project team structure, cost estimating, working out project of software designing, risk management, quality planning, creating and managing project documentation and change management

5. **Literature**

Inżynieria oprogramowania w projekcie informatycznym, red. J. Górski, Mikom 2000
Zarządzanie projektem informatycznym, K. Frączkowski, Wrocław, OWPW 2003
Metodyki zarządzania projektami informatycznymi, Z. Szyjewski, Placet, W-wa 2004
Inżynieria oprogramowania, A. Jaszkiewicz, Helion, 1997
Metody wytwarzania oprogramowania, red. Szejko, Mikom
Classical and Object-Oriented Software Engineering, S.R.Schach, 1999
Managing software requirement, D. Leffingwell, D. Widrig, Addison Wesley, 1999
UML Przewodnik użytkownika, Grady Booch & Co, WNT, W-wa 2002

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	5	3
Classes			
Laboratory			
Project			
Seminar			
Total student's workload	60		

9. **Conditions of the course acceptance**:

written test are the conditions of ranking the lecture

10. **Language**:

Polish

Punkty ECTS
6

1. Course name

Fundamentals of programming I

2. Course description

Lecture

Basics computer programming. The Pascal programming language – an overview of types, instructions and computation. Types, variables and constants. Standard types. Evaluation of expressions with numeric types and arithmetic operators. Simple instructions. Structured instructions. Structured types: arrays and strings. Structured types: records and sets. Structured types: files. Text and defined files. Functions and procedures: declarations and usage. Scope of identifiers. Recursion. Programming with units

Laboratory

Flow charts. Creating, compiling and running Pascal programs using Dev Pascal IDE. Sequential programs with I/O instructions. Pascal programs with constants, variables and arithmetic operators. Pascal programs with logical operators and conditionals. Writing programs with procedures and functions. Single and multi-dimensional arrays and iteration statements. Programming with arrays and records. Reading and writing files. Program modularization.

3. **Prerequisites**

None

4. Aim of the course

The main goal of the lecture is to practice the methodological usage of Pascal language in solving small and medium size algorithmic problems.

5. Recommended reading

Koleśnik K., *Wstęp do programowania z przykładami w Turbo Pascalu*, Wydawnictwo Helion, Gliwice 1999

Kierkowski A., *Turbo Pascal. Ćwiczenia praktyczne. Wydanie II*, Wydawnictwo Helion, Gliwice 2006

6. Type of course

Obligatory.

7. Teaching team

Department of Management and Computer Science

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	1	1
Classes			
Laboratory	30/12	1	1
Project			
Seminar			
Total student's workload	180		

9. **Assessment methods**:

Lecture – written tests, labs - assignments are the conditions of ranking the lab

10. **Language of instruction**:

Polish

Punkty ECTS
6

1. Course name

Fundamentals of programming II

2. Course description

Lecture

C language characteristics, standards and modern IDE. C basics: program structure, data types, variables, constants, operators, I/O basics. Expressions evaluation. Programs with conditionals. Programs with iterations. Functions – parameters types, callings and returns. Arrays and indexes. Basics of pointers. Pointers and one-dimensional arrays. Chars and strings handling. Using pointers to process structures, arrays of structures, unions etc. Dynamic variables. Processing linked lists. File types and handling. The C preprocessor directives. Standard and user-defined libraries.

Laboratory

Creating, compiling and running C programs using Visual Studio. C programs with constants, variables and arithmetic operators. Basic I/O. C programs with logical operators and conditionals. Programs with one- and multi-dimensional arrays. Functions and program modularization. Programming with pointers. Standard libraries. Dynamic memory allocation. Processing linked lists. Reading and writing files.

3. **Prerequisites**

Fundamentals of programming I

4. Aim of the course

The student acquires the ability to structured programming in C using the modern environment IDE, i.e. Visual Studio. He meets a rich set of instructions, operators, library functions and is able to solve small and medium size algorithmic problems operations using complex data types and dynamic data structures. Acquired knowledge and skills are also useful for learning programming using object-oriented languages such as C++, Java or C#.

5. Recommended reading

Prata S., *Szkoła programowania. Język C*, Wydawnictwo Helion, wyd. V, Gliwice 2006

Tondo C.L., Wimpel S.E., *Język ANSI C. Ćwiczenia i rozwiązania*, WNT, Warszawa 2003

Koleśnik K., *Podstawy programowania strukturalnego w języku C++*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2006

6. Type of course

Obligatory.

7. Teaching team

Department of Management and Computer Science

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/24	2	1
Classes			
Laboratory	30/12	2	1
Project			
Seminar			
Total student's workload	180		

9. **Assessment methods**:

Lecture – written tests, labs - assignments are the conditions of ranking the lab.

10. **Language of instruction**:

Polish

Punkty ECTS
5

1. Course title

Introduction to Computer Engineering

2. Course contents

Lecture

Introduction to algorithms and flow charts. Computational complexity basics. Positional numeral systems. Alphanumeric codes: ASCII, ISO-8859-2, Unicode. Arithmetic for computers: signed and unsigned numbers. Fixed-point and floating-point numbers. Fixed-point arithmetic: addition, subtraction, multiplication, division. Boolean algebra: axioms, theorems, rules. Simplification of Boolean expression. Boolean functions. Canonical form of Boolean functions. Combinational circuits. Logical functors/gates. Combinational circuits analysis and design: addar, subtractor, multiplexor, decoder etc. Sequential circuits. Registers. Introduction to computer organization and architecture.

Classes

Examples of sequential, conditional and cyclic algorithms. Sorting – analysis of complexity. Positional numeral systems: decimal, binary, octal, hexadecimal. Converting numbers written in different bases. BCD code. Alphanumeric codes ASCII, ISO-8859-2, Unicode. Arithmetic for computers: signed and unsigned numbers. Fixed-point/integer arithmetic: addition, subtraction, multiplication, division. Machine representation of floating-point numbers. Basics of Boolean algebra. Simplification of Boolean expression. Boolean functions. Minterms and maxterms. Canonical form of Boolean functions. Combinational circuits. Logical functors. Combinational circuits analysis and design - examples. Sequential circuits. Basic types of filp-flops and registers. Classical and modern computer organization and architecture. Instruction set.

3. Prerequisites

None

4. Learning outcomes

The main goal of the lecture is the introduction to the concept of algorithm, arithmetic for computers, Boolean algebra, combinational circuits analysis and design. The main goal of the course is presentation of analysis and synthesis principles of combinational circuits and combinational circuits design.

5. Recommended reading

- Skorupski A., *Podstawy budowy i działania komputerów*, WKiŁ, Warszawa 2000.
- Sysło M., *Algorytmy*, Wydawnictwa Szkolne i Pedagogiczne, Warszawa1997.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Networks, Electronics and Telecommunication

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12	1	1
Classes	30/12	1	1
Laboratory			
Project			
Seminar			
Total student's workload	150		

9. Assessment methods

Lecture – exam; classes – tests and assignments

10. Language of instruction

Polish

ECTS credits
4

1. Course title
Methods of artificial intelligence 1
2. Course description
Lecture
Introduction: artificial intelligence, knowledge representation, expert systems,history, examples. Knowledge representation: rule representation of knowledge, semantic nets and decision trees. Knowledge acquisition. Machine learning. Rules generating. Correctness test for knowledge base. Searching methods and strategies. Concluding with probabilistic model. Bayes' decision support systems. Algorithms for complete probabilistic information, Recognition methods. Fuzzy rules. Neural networks: neuron, perceptron, linear networks, back propagation algorithm. Genetic algorithms: classical algorithm and its modifications, practical examples.
Laboratory
Computer realization for methods and algorithms of artificial intelligence. In particular: expert systems, Bayes decision systems, genetic algorithms, fuzzy decision systems.
3. Prerequisites
Mathematics 1, Mathematics 2
4. Learning outcomes
The main goal of the lecture is the introduction to the methods and algorithms of artificial intelligence. In particular decision support systems in practical applications are presented
5. Literature

1.Kurzyński M., *Rozpoznawanie obiektów - metody statystyczne*, Oficyna Wydawnicza PWr Wrocław 1997
2.Mulawka J., *Systemy ekspertowe*, WNT, Warszawa 1996
3.Rutkowska D., Rutkowski L., Piliński M., *Sieci neuronowe, algorytmy genetyczne i systemy rozmyte*, PWN, Warszawa 1997
4.Rutkowska D., *Inteligentne systemy obliczeniowe*, Akademicka Oficyna Wydawnicza, Warszawa 1997
5.Goldberg D., *Algorytmy genetyczne i ich zastosowania*, WNT, Warszawa 1998

6. Type of course
Obligatory
7. Teaching team
Department of Informatics' Application
8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12	5	3
Classes			
Laboratory	30/12	5	3
Project			
Seminar			
Total student's workload	120		

9. Conditions of the course acceptance:
Lecture – oral/written exam, laboratory - credit
10. Language:
Polish

Punkty ECTS
5

1. Course name

Object-oriented design and programming 1

2. Course description

Lecture

Review of the present programming methods, object-oriented programming – basic concepts. C++ language – class and object declaration, construction and destruction, friend classes and functions, static components, operators, class inheritance, virtual functions (polymorphism).

Laboratory

Single-handly implementation of the object-oriented concepts in C++.

3. **Prerequisites**

Programming 2

4. Learning outcomes

Students will be able to design and implement object-oriented application of a small scale, using inheritance, encapsulation during programming in C++ language.

5. Literature

J. Grębosz**,** *Symfonia C++ t. I-III*, Oficyna Wydawnicza Kallimach, Kraków 1996.

B. Stroustrup, *Jezyk C++*, WNT, Warszawa 1993.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/12	3	2
Classes			
Laboratory	30/12	3	2
Project			
Seminar			
Total student's workload			
Lecture	150		

9. Conditions of the course acceptance:

Laboratory and written test are the conditions of ranking the lecture

10. Language:

Polish

Punkty ECTS
4

1. Course name

Object-oriented design and programming 2

2. Course description

Lecture

Review of the present programming methods, object-oriented programming – basic concepts. C++ language – class and object declaration, construction and destruction, friend classes and functions, static components, operators, class inheritance, virtual functions (polymorphism).

Laboratory

Single-handly project of the object-oriented concepts using UML language.

3. **Prerequisites**

Object-oriented design and programming 1

4. Learning outcomes

Students will be able to design object-oriented system and concepts using UML diagrams such as class diagrams, use-case diagrams, activity and sequentional diagrams.

5. Literature

P. Coad , E. Yourdon, *Analiza Obiektowa*, Oficyna Wydawnicza READ ME , Warszawa 1994

P. Coad , E. Yourdon , *Projektowanie obiektowe*, Oficyna Wydawnicza READ ME , Warszawa 1994

M. Flasiński, *Wstęp do analitycznych metod projektowania systemów informatycznych* , WNT Warszawa 1997

J. Grębosz, *Symfonia C++ t. III* , Oficyna Wydawnicza Kallimach, Kraków 1996

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	Year
Lecture	15\12	4	2
Classes			
Laboratory	15\12	4	2
Project			
Seminar			
Total student's workload			
Lecture	120		

9. Conditions of the course acceptance:

Laboratory and written test are the conditions of ranking the lecture

10. Language:

Polish

ECTS credits
5

1. Course title

Operating systems

2. Course contents

Lecture

Introduction, structures of the operating systems. Processes concept. CPU scheduling algorithms. Process synchronization - producer-consumer problem, solutions of the critical section problem. The problem of dining philosophers, readers-writers problem, Dijkstra semaphores. Interprocess communication. Process Deadlocks. Necessary and sufficient conditions for a deadlock. Deadlock detection, prevention, avoidance. Operating memory management. Dynamic Linking Library (DLL), Dynamic Loading, Overlays. Contiguous memory allocation. Discrete memory model - paging. Virtual memory. Demand paging. Page replacement and allocation of frames algorithms. Hard disk structure. Device catalogue. Free disk spaces management. Disk scheduling algorithms. File system. File concept, directory structure, file operations. File information access methods. File protection. Protection systems. Goals, domains of protections. Internal structures and functions of the I/O system. Distributed systems. Operating systems - case studies (Unix, Linux, MS Windows NT).

Laboratorium

Students will study Linux operating system. They will learn the main programs like telnet, ftp, shell's commands and how to use input-output devices. They will learn how to write batch programs. They develop practical abilities connected with installation and configuring of aforementioned system and writing concurrent processes.

3. Prerequisites

none

4. Learning outcomes

Students know how to describe and recognize the main elements of operating systems.They know the main principles of designing elements of aforementioned systems..

5. Recommended reading

a. Silberschatz A., Peterson J.L., Galvin P.B., *Podstawy systemów operacyjnych*, WNT Warszawa 2006
b. Bach M.J., *Budowa systemu operacyjnego UNIX*, WNT, Warszawa 1995
c. Lister A.M., Eager R.D., *Wprowadzenie do systemów operacyjnych*, WNT Warszawa 1994
d. Starllings W., Systemy operacyjne, Robomatic, Wrocław 2003.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/24	4	2
Classes			
Laboratory	30/12	4	2
Project			
Seminar			
Other			
Total student's workload	150		

9. Assessment methods

Positive mark laboratory and written exam are the conditions of ranking the lecture

10. Language of instruction

Polish

ECTS credits
5

1. Course title

Security of computer systems

2. Course contents

Lecture

Basic definitions. Analysis of threats and vulnerabilities. Cryptography: classical encrypting techniques, symmetric and asymmetric encrypting algorithms, hashing functions. Key distribution, implementation of security services using encrypting techniques – methods and tools. Digital signature, public key infrastructure, virtual private networks. Access control. Firewalls. Wireless networks security. Security evaluation criteria for computer systems. Designing and implementation of security policy, legislative aspects of teleinformatic systems security, norms and standards.

Seminar

Newest trends and solutions (including tools) for computer systems and networks security (secured communication protocols, securing method for servers and workstations), attack and cracking techniques, security of web services (e-commerce, e-banking), designing and implementation of security policy.

Project

Practical implementation of security solutions (self-contained or built in operation systems). Utilizing of tools for cracking and security testing.

3. **Prerequisites**

none

4. **Learning outcomes**

Student is able to: explain the difference between symmetric and asymmetric encrypting techniques, specify and describe contemporary encrypting algorithms, encrypt and decrypt data using classical encrypting techniques, specify the features of hashing functions, propose the solutions for secured key distribution, analyze implementation of encrypting techniques in internet tools (browsers, mail tools, remote terminal tools), demonstrate the process of generating and verification of digital signatures, describe the structure of public key certificate, analyze security aspects of wireless networks, describe functions and configuration rules of firewalls, use in practice tools for cracking and breaks, configure and run chosen security mechanisms, analyze threats and vulnerabilities, formulate the security policy, specify criteria and rules for security evaluation of teleinformatic systems.

5. **Recommended reading**

1. M. Strebe, Podstawy bezpieczeństwa sieci, Mikom, Warszawa, 2005
2. E. Cole, R. Krutz, J. Conley, Bezpieczeństwo sieci : biblia, Helion, Gliwice, 2005.
3. A. Carlisle, PKI: podstawy i zasady działania : koncepcje, standardy i wdrażanie infrastruktury kluczy publicznych, WNT, Warszawa, 2007.
4. J. Stokłosa, Ochrona danych i zabezpieczenia w systemach teleinformatycznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2003
5. R. Wobst, Kryptologia budowa i łamanie zabezpieczeń, RM, Warszawa, 2002.

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Networks, Electronics and Telecommunication

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30 / 24	6	3
Classes			
Laboratory			
Project	15 / 12	6	3
Seminar	30 / 24	6	3
Other			
Total student's workload	150		

9. **Assessment methods**

lecture – final test, seminar – grading the presentation and access in discussion, project – grading the documentation (security project or report with results of experiments)

10. Language of instruction

Polish

ECTS credits
3

1. Course title

Microprocessor Techniques and Embedded Systems

2. Course contents

Lecture

Introduction
- processors short history
- von Neumann vs harvard architecture of processor
- microcontrollers genealogy
-basic conceptions and architecture of processor and processor system
- description of additional elements of processor and their serve methods
- Single chip microcomputers:
- methods of microprocessor system parts connecting
- methods of service of internal and external parts of system – programming examples.
- microprocessor systems in practical use
- Embedded systems
- examples

Labs

Initiating of simple modular microprocessor systems – basics of microcontroller programming
Programming of simple control algorithms. Work with MMI subsystems.

3. **Prerequisites**

Passed following courses: podstawy układów cyfrowych, architektura komputerów

4. **Learning outcomes**

Students know basic architecture of microcontrollers and methods of cooperation with external elements.
They can code, debug and test simple algorithms of classic microcontrollers modules work.
Students know basics of embedded systems. They can define, analyze and project ideas of ES.

5. **Recommended reading**

1. Baranowski J. (red), Modułowe systemy mikrokomputerowe, WNT, Warszawa 1984.
2. Niederliński A. Mikroprocesory, mikrokomputery, mikrosystemy, WNT, Warszawa 1998.
3. Rydzewski A., Sacha K., Mikrokomputer - elementy, budowa, działanie, Sigma, W-wa 1987.
4. Niederliński A., Systemy komputerowe automatyki przemysłowej, WNT, W-wa, 1998.
5. Budkowski S., Papliński A.,Sosnowski J., Zespoły i urządzenia cyfrowe,WNT, W-wa, 1979
6. Misiurewicz P., Grzybek M., Półprzewodnikowe układy logiczne TTL, WNT, W-wa, 1982
7. Zieliński B., Układy mikroprocesorowe. Przykłady rozwiązań, Helion, W-wa, 2002
8. Dokumentacja techniczna producentów mikrokontrolerów. (Intel, Atmel, Motorola..)

6. Type of course

Obligatory

7. **Teaching team**

Department of Computer Systems and Informatics Application

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30	5	3
Classes			
Laboratory	15	5	3
Project			
Seminar			
Other			
Total student's workload	45		

9. **Assessment methods**

Colloquium, rating of controlled and individual works of students

10. Language of instruction

Polish

Subject for speciality:

ECTS credits
6

1. Course title
Electroenergetics in industrial plants
2. Course contents
Lecture
1. Characters industrial plants as customers electric energy.
2. General rules energetic economy in industry.
3. Diagrams of electroenergetic discharges.
4. Appointment methods foreseeing electroenergetic discharges.
5. Criterions applied to choice the electroenergetic structure.
6. Relability supplying in industrial plants.
7. Electric energy quality.
8. The influence deviations and oscillations of voltage for work of electric energy customers.
9. The influence of asymmetry, non-sinusoid and frequency variations for work of electric energy receivers.
10. Voltage regulation in electroenergetic industrial nets.
11. Supplying of electric energy in industrial plants.
12. Rational electric energy utilization.
13. Forecasts of discharges and consumption energy.
14. Reactive energy economy.

3. Prerequisites
Introduction to Production Management
4. Learning outcomes
Students are able to characterize production systems in industrial plants, define main conditionings of organizing in production processes, classify and compare the methods adapted in investigations of energy management and also analyze day or year diagrams of electroenergetic discharges in productive plants.
5. Recommended reading
1. Weiss Z.: Techniki komputerowe w przedsiębiorstwie. Wyd. Politechniki Poznańskiej, Poznań 2008.
2. Teresiak Z.: Elektroenergetyka zakładów przemysłowych. Wyd. Politechniki Wrocławskiej, Wrocław 2001.
3. Wnukowska B.: Metodyka analizy i prognozowania potrzeb energetycznych odbiorców przemysłowych. Wyd. Politechniki Wrocławskiej, Wrocław 2005.
6. Type of course
Elective
7. Teaching team
Department of Industrial Electroenergy
8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/14	II	1
Classes			
Laboratory			
Project			
Seminar			
Other			
Total student's workload	180		

9. Assessment methods
Test
10. Language of instruction
Polish

ECTS credits
2

1. **Course title**
   Digital assembly of multimedia files
2. **Course contents**
   Lecture
   - Audio-video acquisition (analog and digital; file formats; codecs);
   - Video compression algorithms;
   - Pinnacle Studio (interface, audio-video acquisition)
   - Digital assembly
   - Soundtracks
   - Audio-video special effects
   - DVD authoring
3. **Prerequisites**
   none
4. **Learning outcomes**
   Students know how to use the basic methods of digital assembly of audio-video files. They are able to choose the right audio-video standard for their projects. They know the right audio-video software appropriate for these projects.
5. **Recommended reading**
   1. Deras Flynn, „Tworzenie cyfrowego wideo”, Helion 2002
   2. Jennie Bourne, Dave Burstein, „Wrzuć film! Web Video od pomysłu po realizację”, Helion 2009
   3. Materiały dydaktyczne i pomocnicze pakietów Pinnacle Studio oraz DVD-lab Pro
6. **Type of course**
   Obligatory
7. **Teaching team**
   Zakład Systemów Komputerowych i Zastosowań Informatyki
8. **Course structure**

Form	Number of hours	Semester	Year
Lecture			
Classes			
Laboratory	30	V	III
Project			
Seminar			
Other			
Total student’s workload	60		

9. **Assessment methods**
   Based on weekly assignments.
10. **Language of instruction**
    Polish

ECTS credits
2

1. Course title

Diploma seminar

2. Course contents

Seminar

Students present selected topics in the research domain.

3. Prerequisites

Only students of the 7th semester which chose the subject of final thesis can participate in the seminar.

4. Learning outcomes

.... Students develop their ability the presentation of own results.

5. Recommended reading

1. ....

2. ....

3. ....

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	Year
Lecture			
Classes			
Laboratory			
Project			
Seminar	30/24	7	4
Other			
Total student's workload	60		

9. Assessment methods

Attendance in classes. Presentation results of the work.

10. Language of instruction

Polish

ECTS credits
4

1. Course title

Visual Programming

2. Course contents

Lecture

During the course of lectures students learn method of designing and development of application using RAD development environments. The lectures focus on designing user interface, using elements distributed in component libraries, events handling, database access, and creating SDI and MDI application.

Classes

During the Classes students learn selected RAD development kit such as Borland C++ Or MSVisual Studio. Students create applications according the list strictly related with topics presented in the course of lectures.

3. Prerequisites

Ability of object oriented programming with use of C++ language according to courses that took place in previous semesters.

4. Learning outcomes

- Students will be able to analyze system requirements for given application and design system architecture appropriate for application designed for Windows operating systems developed with means of selected RAD development kit.
- Students will effectively use the following techniques offered by RAD SDK:
  - visual programming of user interface,
  - visual components of user interface libraries ,
  - database access components libraries.
- Students will developer application based on events handling, exploiting multitasking and exceptions handling.
- Students will design ergonomic client application that access database systems. They will access databases on the level of selected tables as well as by means of embedded SQL including Data Modification Language.
- Students will create component and functions libraries dynamically linked (DDL)
- Students will developer document based application in SDI and MDI architecture.

5. Recommended reading

- Andrzej Daniluk, C++Builder Borland Developer Studio 2006. Kompendium programisty, wyd. Helion
- Jacek Matulewski, C++Builder i Turbo C++. Podstawy, wyd. Helion
- Jerzy Grębosz, Symfonia C++, tom 1,2,3

6. Type of course

Obligatory/elective/optional

7. Teaching team

Department of ...

8. Course structure

Form	Number of hours	Semester	Year
Lecture	15	4	2
Classes			
Laboratory	30	4	2
Project			
Seminar			
Other			
Total student's workload	45		

9. Assessment methods

- Assessment of realized projects (classes).
- Final test (lectures)

10. Language of instruction

Polish

ECTS credits

1. Course title

Programming mobile devices

2. Course contents

Lecture

During the course of lectures students learn issue related with mobile device development such as PDA or mobile phones. They learn specific aspects of mobile programming especially limitation of mobile devices. Students learn methodology of application development with MSVisual Studio, components library provided for mobile devices, with C#.

Classes

During the Classes students learn and test in practice selected aspects of mobile programming by realization of selected projects

3. Prerequisites

Ability of application development with means of C++ and RAD Software Development Kits.

4. Learning outcomes

- Students will be able to analyze system requirements for given application and design system architecture appropriate for application designed for chosen mobile device (PDA or mobile phone).
- Students will effectively use the following techniques offered by MS Visual Studio :
    - Smart Device application
    - visual programming of user interface,
    - visual components of user interface libraries ,
    - database access components libraries.
- Students will develop application dedicated for mobile device (client application Or WEB application) in one of selected technology (depending on selected projects).
    - Database mobile device client application accessing MSSQL Server Compact Edition dedicated for PDA with Windows Mobile operating system,
    - Database WEB application for mobile device,
    - Mobile application accessing XML datasets
    - Mobile client application exchanging data with selected Internet Services

5. Recommended reading

- W. Hołubowicz, P. Płuciennik. Systemy łączności bezprzewodowej. PDN, 1997
- Meyer E.A., CSS Erica Meyera. Sztuka projektowania stron WWW, Helion, Gliwice 2005.
- Stępień M., WAP dla każdego, Helion Gliwice 2001
- S. Shekhar, S. Chwala. Spatial database. A tour. Prentice Hall, 1983
- Schwendiman B., PHP4. Kompendium programisty, Helon, Gliwice 2002.
- Hauser T., Wenz Dh., Mambo. Tworzenie wydajnych serwisów internetowych, 2006
- McLaughlin B., Java i XML, , Helion 2007.

6. Type of course

Obligatory/elective/optional

7. Teaching team

Department of ...

8. Course structure

Form	Number of hours	Semester	Year
Lecture	15	5	3
Classes			
Laboratory			
Project	30	5	3
Seminar			
Other			
Total student's workload	45		

9. Assessment methods

- Assessment of realized projects (classes).
- Final test (lectures)

10. Language of instruction

Polish

ECTS credits
3

1. Course title

Team project

2. Course contents

Project

The main goals of course are practical exercises connected with software project management for the chosen firm. The software for any enterprise will be designed in chosen project life cycle. Additional project of computer network and necessary hardware may be done. Each project will have to be conducted by team consists of 6-8 persons. The Project team will hale to present the complete documentation (analysis and design of objectives, technical documentation, project of risk management, quality planning, cost estimation and project schedule).For necessary human resources and time estimation Gantt's diagrams or PERT nets can be used. The project team can use another method like COCOMO or FPA.

The project schedule will have to do in the any software tools like MS Project or any other freeware or shareware supporting work of project manager.

Each Project team will choose the Project manager which will be responsible for coordination of team work. Four stages of project design (analysis of objectives, risk identification and management, quality planning and project's schedule) will be presented during the seminars.

3. Prerequisites

.none

4. Learning outcomes

Students learn how to manage computer project, risk in the project, how to plan product's quality and estimate project cost

Students develop abilities of designing software according structural or object approach, revising project of software, designing of project team structure, cost estimating, working out project of software designing, risk management, quality planning, creating and managing project documentation and change management

5. Recommended reading

a. Robertson S., Robertson J., *Mastering the Requirements Process,* Addison-Wesley, 2006.
b. Van Lanmsweerde A., Requirements Engineering, Wiley, 2009.
c. Alexander I., Beus-Dukic L., Discovering Requirements. How to specify Products and Services, Wiley, 2009.
d. A Guide to Projekct Management Body of Knowledge (PMBOK Guide) 4th Ed.
e. Davidson J., *Kierowanie projektem. Praktyczny poradnik dla tych, którzy nie lubią tracić czasu*, Wyd. Liber, Warszawa, 2002
f. Philips J., *Zarządzanie projektami* IT, Helion Gliwice, 2005.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	Year
Lecture			
Classes			
Laboratory			
Project	30/24	7	4
Seminar			
Other			
Total student's workload	90		

9. Assessment methods

Evaluating of project

10. Language of instruction

Polish

ECTS credits
2

1. Course name

Windows NT administration

2. Course description

Laboratory

Introduction. The history of Windows system development - Windows NT/2000/2003 Server
Active Directory in Windows 2003 systems
Group and user accounts,
File system – NTFS
Managing Group Policy

3. Prerequisites Operating systems

4. Aim of the course The student be able to design the logical structure of the Active Direrectory database for one domain. The student be able to build and configure the environment of the users in the one domain of Microsoft Windows Server 2003 system.

5. Literature

Microsoft Windows Server 2003 - Vademecum Administratora., Promise, Warszawa 2003.
Morimoto R. i inni, *Windows Server 2003.Księgaeksperta* , Helion, Gliwice, 2004.
Materiale from the Microsoft Web page

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	year
Lecture			
Classes			
Laboratory	30/24	6	3
Project			
Seminar			
Total student's workload	60		

9. Conditions of the course acceptance

Execution of laboratory exercise.

10. Language

Polish

Subjects for speciality: Computer systems and networks

ECTS credits
6

1. Course name

Designing of the database systems

2. Course description

Lecture

- Design methodology of the database systems. Lifecycles of the database system.
- Data flow diagrams. CRUD matrix. Conceptual data modelling.
- ERD notation. Relational modelling. Top-down modelling method.
- Architecture desing of the database system.
- User interface design.
- Test design for database system.
- Administration and tunning of the database system.
- A principles of the database system documentation.

Project

Modelling the database system using dedicated DBMS. The main objectives of the project are:

Design the relational database schema.
Design GUI of the system.
Create the documentation of the system.

3. Prerequisites

Database system course

4. Aim of the course

Students be able to propose the logical model for any computer system. Reached knowledge allows to study and proposing the relational database models. Development the skill of a database design, using CASE environment and waterfall lifecycle.

5. Literature

[1] Ullman J.D., Widom J., *Podstawowy wykład z teorii systemów baz danych*, WNT, Warszawa, 2002
[2] Beynon-Davies P., *Systemy baz danych*, WNT, Warszawa 2002
[3] Date C.J., Darwen H., *SQL - omówienie standardu języka*, WNT, Warszawa, 2001

6. Type of course

Obligatory

7. Teaching team

Department of Computer Systems

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12	5	3
Classes			
Laboratory			
Project	30/24	5	3
Seminar			
Total student's workload	180		

9. Conditions of the course acceptance:

Lecture: written test;
Project: application with the database, documentation

10. Language:

Polish

ECTS credits
6 / 4

1. Course title

Foundation of Computer Simulation

2. Course contents

Lecture

Introduction to computer simulation. Basic terms. Examples. Input-output models of systems. Complex operation models – graph models. Time - cost model to job performing system. Identification as a choosing of the best model. Algorithms. Examples. Static discrete system simulation – optimal decision making. Dynamic discrete system simulation – analysis, decision making. State trajectory. Examples of simulation for selected problems in computer science and computer engineering: choice of efficient configuration of computer network with star topology (minimization of transmission and processing costs), task scheduling in multi-processor system - no constraints case, constrained task scheduling in multi-processor system. Rules for carrying out computer simulation experiments. Experiment design. Presentation of results of simulations. Scheduling. Gantt's Diagram. Using MS Project package.

Laboratory

Familiarizing with examples of simulations found in Internet. Making investigations based on simulations (following procedure: design of experiment, collecting observations, analysis of results, conclusions, working out written report), including: task #1 (in 2-3 persons groups) – investigating influence of selected parameters on efficiency of computer network configuration in star topology (with transmission and processing costs minimization); task #2 (in 2-3 persons groups) – checking own research theses (each member of group = different thesis) for their own problem (found in Internet) using application accepted by teacher. Familiarizing with MS Project package and using this package for performing task #3 (individual) – making Gantt's diagram and finding critical path for the created complex job (accepted by teacher) taking into account assigned requirements: at least two processors, at least the number of ten of the defined operations, parallel performing for some operations, etc. and presenting results in written report

3. Prerequisites

None

4. Learning outcomes

The main goal of the lecture is giving students some knowledge in computer simulation area including methodological tasks such as creating models, carrying out efficient experiments, solving optimization problems as well as making students familiar with computer tools for simulation on example of MS Project package.

5. Recommended reading

- *Ćwiczenia z zastosowaniem MS Project*, Wydawnictwo Mikon, Warszawa 2005.
- Gutenbaum J., *Modele matematyczne systemów*, Wydawnictwo Exit, Warszawa 2003.
- *Podstawy symulacji komputerowej*, Praca zbiorowa, Wyd. AGH, Kraków 1996.
- Tyszer J. *Symulacja cyfrowa*, WNT, Warszawa 1990.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Networks, Electronics and Telecommunication

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12	6	3
Classes			
Laboratory	30/12	6	3
Project			
Seminar			
Total student's workload	180		

9. Assessment methods

Lecture – passing exam (written test, positive grade on laboratory).

Laboratory – working out assigned tasks (positive grades of three written reports).

10. Language of instruction

Polish

ECTS credits
4

1. Course title

System Techniques Basics

2. Course contents

Lecture

Introduction. Basic notions and definitions. Classification of systems – SISO, MISO, SIMO, MOMO. Linear systems. System description – block-diagrams, matrix equations. Creation of systems. Mathematical models of systems. Complex systems. Typical structures of systems: cascade, parallel, feedback, mixed. System aggregation and decomposition. Aggregation algorithms. Examples of large scale systems: process of studying, time-cost model of processing. Basic methods of system techniques with expert knowledge and experimental knowledge. Identification of systems: algorithms, examples. Classification of systems: algorithms, examples. Control: algorithms, examples.

Laboratory

Assignment 1. Construction of mathematical models of systems and solving selected assigned problems to these systems using MAPLE system, in particular with applying graphics and animation modules. Assignment 2. Creation of input-output system for the assigned real-life process on the basis of properly processed expert knowledge, including the choice of input variables correlated with the defined output variable. Examples of real-life processes: studying, shopping, resting, travelling, housing. Assignment 3. Implementation of the designed decision making system (computer program) to aid process considered in assignment 2.

3. Prerequisites

Basic knowledge of matrix algebra and computer programming.

4. Learning outcomes

Students gain skills and abilities in: constructing mathematical models of systems on the basis of expert knowledge and experimental knowledge, acquitting and collecting knowledge, solving aggregation tasks for cascade, parallel and feedback complex systems, solving basic problems in the areas of identification, classification and control. Students become familiar with MAPLE system, especially with graphics and animation modules. Students develop skills in programming and implementing decision making systems.

5. Recommended reading

1. Bubnicki Z., *Problems nad Algorithms for Control*, PWN, Warsaw 2002 /in Polish/
2. Gutenbaum J., *Mathematical Modeling of Systems*, Omnitech Press, Warsaw 1996 /in Polish/
3. Kaczorek T., *Control Theory*, PWN, Warsaw 2004 /in Polish/.
4. Koszałka L., Kurzyński M.,*Problems and Excercises in the areas of identification, experiment design and pattern recognition*, Publishing House of WUT, Wrocław 1991 /in Polish/

6. Type of course

Obligatory

7. Teaching team

Division of Computer Systems and Information Technology Applications

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/24	4	2
Classes			
Laboratory	30/12	4	2
Project			
Seminar			
Other			
Total student's workload	180		

9. Assessment methods

Grade on the basis of written test correlated with lectures and of quality of executing laboratory tasks assigned

10. Language of instruction

Polish

ECTS credits
2

1. Course title

Management Information Systems

2. Course contents

Introduction to management processes, strategic uses of information systems and IT. Information technology in business: hardware, software, telecommunication and networks, internet and intranet. Organization of information systems and services. Information systems in decision making. Information systems for manufacturing and inventory control. Information systems in business function of marketing, distribution and sales. Logistic information systems. Computer aided engineering systems and business processes optimization. Modeling and simulation. Systems MRP,MRPII, ERP; functions, methods and algorithms. Functions and algorithms in MM, SD,PP, FI, CO modules. Notions and concepts of virtuals, extended and fractal enterprises. BI, MIS, DSS, KBS systems. Controls and security, critical aspect of security.

3. **Prerequisites**

none

4. **Learning outcomes**

The objective is to provide the basic business processes knowledge (technology, equipment, organization) with respect to the application of different methods and techniques for managerial information systems. The students be able to use and understand different algorithms and functionality of MIS. The students will be able to weigh the positive and negative impact of information technology for business processes, understand the increasing use of IS to support decision making from the operational to the executive levels.

5. **Recommended reading**

1. A. Januszewski, Funkcjonalność informatycznych systemów zarządzania; zintegrowane systemy transakcyjne, WN PWN, Warszawa, 2008
2. P.Adamczewski, Zintegrowane systemy informatyczne w praktyce, Wyd. Mikom, Warszawa, 2003
3. P. Lech, Zintegrowane systemy zarządzania ERP i ERP II – wykorzystanie w biznesie, wdrażanie, Wyd. Difin, Warszawa, 2003
4. A. Kijewska, Systemy informatyczne w zarządzaniu, Wyd. Politechniki Śląskiej, Gliwice, 2005
5. E. Oz, Management Information Systems, International Thomson Publishing, Cambrige, 1998
6. C. Evans, Zarządzanie wiedzą, PWE, Warszawa, 2005

6. Type of course

Obligatory

7. **Teaching team**

Department of Production Engineering and Logistics

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/12	4	2
Classes			
Laboratory			
Project			
Seminar			
Other			
Total student's workload	60		

9. **Assessment methods**

Written test

10. Language of instruction

Polish

ECTS credits
5

1. Course name

Selected Aspects of Computer Networks

2. Course description

Lecture

Design of local computer networks:
cabling systems,
devices,
Ethernet,
VLAN.
Examples of software and hardware solutions.
Wireless networks.
Advanced methods of network design..

Seminar

A presentation on a subject connected to computer networks.

3. Prerequisites

Computer Networks 1 and Computer Networks 2

4. Learning outcomes

Students can classify computer networks. Students can design a computer network including: initial analysis, selection of technology, devices and cables, IP configuration, security mechanisms.

5. Recommended reading

Cisco Systems, *Akademia Sieci Cisco Pierwszy Rok Nauki*, Mikom
Cisco Systems, *Akademia Sieci Cisco Drugi Rok Nauki*, Mikom
Kasprzak A., *Rozległe sieci komputerowe z komutacją pakietów*, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław, wydanie II, 1999
Woźniak J., Nowicki K., *Sieci LAN, MAN i WAN – protokoły komunikacyjne*, Wydawnictwo Fundacji Postępu Telekomunikacji, Kraków, 1998
K. Nowicki, J. Woźniak, *Przewodowe i bezprzewodowe sieci LAN*, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2002.

6. Type of course

Obligatory

7. Teaching team

Department of Computer Networks

8. Course structure

Form	Number of hours	Semester	year
Lecture	30/12	5	3
Classes			
Laboratory			
Project			
Seminar	30/24	5	3
Total student's workload	150		

9. Assessment methods:

seminar and written test are the conditions of ranking the lecture

10. Language:

Polish

Subject for speciality: Computer graphics

ECTS credits
3

1. **Course title**
   Design of graphics applications
2. **Course contents**
   Project
   - Working with bitmaps and vectors
   - Graphic elements for WWW sites and multimedia presentations
   - Basics of computer animations
   - Working in 3D – creating visualizations and advanced 3D-scenes
3. **Prerequisites**
   none
4. **Learning outcomes**
   Students can create advanced graphics Project. They are able to use different applications and graphic software bundles. Students can create WWW sites, multimedia presentations, 3D visualizations etc.
5. **Recommended reading**
   1. Kwaśny A., *DTP - Księga eksperta*, Helion, Gliwice 2002
   2. Aaland M., *Photoshop 5.5. Zastosowania w Internecie*, Helion, Gliwice 2000
   3. Czarnecki T., *Page Maker – ćwiczenia praktyczne*, Helion 2002
6. **Type of course**
   Obligatory
7. **Teaching team**
   Zakład Systemów Komputerowych i Zastosowań Informatyki
8. **Course structure**

Form	Number of hours	Semester	Year
Lecture			
Classes			
Laboratory			
Project	30	VII	IV
Seminar			
Other			
Total student's workload	90		

9. **Assessment methods**
   Based on one major assignment.
10. **Language of instruction**
    Polish

ECTS credits
2

1. **Course title**
   Multimedia presentations
2. **Course contents**
   Lecture
   Introduction. Form and content of the multimedia presentation. Characteristics of effective presentation. Proper use of pictures, sounds and animations.
   Overview of the most popular presentation applications.
   Microsoft PowerPoint 2003 PL – introduction to user interface and program configuration.
   Project and slide templates, color schemes.
   Working with charts, diagrams and tables. Incorporating data from different sources.
   Inserting, positioning and sizing graphical objects.
   Presentation summary; slides sorting; producing a slide show.
   Preparing a presentation for printing and online distribution.
   Using sound and animation special effects.
   Project
   Working with PowerPoint – completing chosen tasks; managing form and content of the presentation, depending on various project concepts and requirements.
3. **Prerequisites**
   None
4. **Learning outcomes**
   Attainment skills of planning presentation. Achievement selection rules of template. Selection the proper color spectrum. Formatting content of slides. Project and adding miscellaneous of animations. Testing of the presentation. Saving the presentation at miscellaneous forms and formats of files. Printing the summary of the presentation. Implementation of the presentation in practice.
5. **Recommended reading**
   1. Łuszczyk E., PowerPoint 2003 wersja polska. Ćwiczenia, Mikom 2007
   2. Altman R.B., Po prostu PowerPoint 2003 PL, Helion 2004
6. **Type of course**
   Obligatory
7. **Teaching team**
   Department of Computer Systems.
8. **Course structure**

Form	Number of hours	Semester	Year
Lecture	15/12	4	2
Classes			
Laboratory			
Project	15/12	4	2
Seminar			
Other			
Total student's workload	90		

9. **Assessment methods**
   Project (tasks completed in PowerPoint 2003PL) and written test are the conditions of ranking the lecture.
10. **Language of instruction**
    Polish

ECTS credits
4/2

1. Course title

Desktop Publishing

2. Course contents

Lecture

In the course of lectures students learn techniques of professional desktop publishing such as: vector and raster graphics processing, designing short and large documents such as books, leaflets, etc.

Classes

During the Classes students get proficiency in using Adobe Creative Suit applications (Photoshop, Illustrator, InDesign) and learn how to realize tasks presented during the lectures.

3. Prerequisites

Basic knowledge on raster and vector graphics.

4. Learning outcomes

- Students will effectively use techniques of documents processing using: layers, masks, and channel.
- Students will correctly prepare documents for publication with definition key parameters such as: working color space, resolution and size.
- Students will process raster pictures using Adobe Photoshop using (among the others) following techniques:
  - RAW file processing
  - Correction of exposition
  - Correction of colors
  - Conversion to monochromatic picture
  - Blurring and sharpening
  - Advanced filters
- Students will prepare vector graphics documents in Adobe Illustrator using (among the others) following techniques:
  - Designing and creation object based on vectors
  - Strings definitions
  - Paths definition
- Students will prepare books in Adobe InDesign using (among the others) following techniques:
  - Base pages definition
  - Graphics and text frames
  - Managing with characters, paragraph, objects, tables parameters and styles
  - Color managements
  - Using documents prepared in Illustrator and Photoshop

5. Recommended reading

- Zakrzewski P., Kompendium DTP, Helion, 2009
- Busch D., Fotografia cyfrowa i obróbka obrazu. Wprowadzenie, Helion, Gliwice 2002
- Kwaśny A., Od skanera do drukarki, Helion, Gliwice 2001
- Phyllis D., Po prostu GIMP, Helion, Gliwice 2000

6. Type of course: Obligatory/elective/optional

7. Teaching team

8. Course structure

Form	Number of hours	Semester	Year
Lecture	30/15	5/6	3
Classes			
Laboratory	30/30	5/6	
Project			
Seminar			
Other			
Total student's workload	60/45	5/6	

9. Assessment methods

- Assessment of realized projects (classes).
- Final test (lectures)

10. Language of instruction: Polish