Zał. nr 2 do ZW 64/2012

Attachment no. …. to Programme of Education

PROGRAMME OF STUDIES

1. Description

Number of semesters:	*Number ECTS points necessary to obtain qualifications: 210*
Prerequisites (particularly for second-level studies): *The competition of grades from maturity certificate and certificate of secondary school.* *In case of foreign students, secondary school certificate, received after the completion of a recognized secondary school (total 12 years of education), being the equivalent of Polish maturity certificate accepted by Kuratorium Oświaty.*	*Upon completion of studies graduate obtains* *professional degree of: engineer (inż)* *1st/~~2nd~~* level qualifications*
Possibility of continuing studies: *the possibility to continue study at the second level*	*Graduate profile, employability:* *First level studies (undergraduate - engineer degree) are not divided into specializations. It gives students opportunity to get basic knowledge in the area of informatics including programming, algorithms and data structures, programming languages and techniques, computer architecture, computer networks, databases and data warehouses, embedded systems including mobile systems, distributed and web-based systems, multimedia, intelligent systems and IT project management - needed for design, development and exploitation of modern IT solutions among others for the Internet and e-economy. Studies shows a variety of computer applications in technical, economic and biomedical systems. They learn methods of data collection and processing, basic of decision-making, methods*

	of artificial intelligence and expert systems. IT knowledge is complemented by knowledge of physics and mathematics, management science and social communication. The graduate has the ability to efficiently use modern tools of information technology and has wide social skills such as ability to cooperate and work in a team, understands the needs and knows the capabilities of continuous education, understands the ethical, economic and law conditions of computer engineer activity. He knows English language at the B2 level. In the case of foreign students studying in English language, they know Polish language at a basic level. *Obtained knowledge and abilities gives opportunity to continue education at the second level by choosing one of 12 specialisation offered by Faculty of Computer Science and Management: security of information systems, informatics technologies of knowledge management, intelligent information systems, Internet and mobile technologies, software engineering, information systems, database systems, decision support systems, teleinformatics, intelligent information systems, computer engineering, information technologies. It is a general Faculty offer. In each admission process different specializations may be open, which one will be open depends on students preference. Moreover some of the specializations and the first level of study in each academic year are given in English also.* *Gained during first level of study skills can be grouped into five groups of skills:* *• use modern information technology tools and systems* *• design and create software solutions in IT and non-IT systems for various applications and made in different technologies*

	• implementation and deploying efficient, reliable, safe and satisfying user requirements IT solutions *• evaluation, improvement, proposing and developing solutions that include computer system,* *• management, administration, installation, deploying, and testing of IT tools and systems* *A graduate can be employed in companies that produce software or in companies, which designs, deploys and administers computer networks or computer systems for different applications in economic or social sectors of public and private organizations:* *• Application / system programmer* *• Network administrator* *• Linux / Windows systems administrator* *• Computer engineer / IT specialist / serviceman / tester* *• Webdesigner/Webdeveloper/Webmaster* *A graduate can works as an employee or manager as well as can be IT company owner.*
Indicate connection with University's mission and its development strategy:	*Informatics field of study is carried out at the Faculty of Computer Science and Management, which is one of the largest of 12 faculties of Wrocław University of Technology. Teaching program at Informatics field of study at the first level of study represents differentiated substantially canon of knowledge, skills and competencies necessary for modern informatics engineer. It is consistent with the mission of the University and its development strategy, which requires from graduates certain the skills with an emphasis on social skills and competences to allow actively formulate and build the private future and prosperity as well as at the University, and the region. Offered curriculum meets the*

	requirements of the National Education Framework and builds graduate skills, based on current and future information technology methods and tools, which vary significantly in education cycle. Substantive differentiation of program is justified by dynamically changing market needs, and by academics having the highest qualifications in the discipline of informatics. Development of Informatics field of study is realized by participating of Institute of Informatics in different international research and educational programs, for example: ERASMUS, COST, etc. Academics and students take part in these programs carrying out research as well as diploma theses. Teaching at a high level based on the modern and constantly modernized laboratories in which students can develop their practical skills. The Institute has the necessary computing equipment, laboratories and software for the first level students, moreover ZPI and diploma students have access to integrated virtualized computing platform. According to the mission of the University for needs in terms of relations with region and its economy, the Institute has strong relations with local as well foreign IT companies. Cooperation with companies includes the following forms: ordering projects by IT companies, ordering projects by IT companies, ordering reviews for innovation, special lectures for students conducted by experts from companies, realization by students diploma thesis on topics in which company is interested in, realization during Team Project course projects in which company is interested in, practical training for students, sponsoring of student competitions organized by the Institute of Informatics, joint seminars of business professionals and employees of the Faculty of Computer Science and Management organized by the IT Companies Forum, hardware and software support by IT companies for academic initiatives. The most important companies which cooperates with the Institute of Informatics are as follows: Capgemini, IBM, Microsoft Corp., Nokia Siemens Networks, Volvo,

	InsERT. The Institute of Informatics is one of the first academic institution, which have a laboratory for students with specialized professional training, organized by the IBM Academic Initiative, Microsoft IT Academy, Cisco Academy, Advanced Digital Broadcasting. What's more these activities are included into teaching process.

2. Fields of science and scientific disciplines to which educational effects apply:

Fields of science: technical sciences

Scientific discipline: informatics

3. Concise analysis of consistency between assumed educational effects and labour market needs

Correspond to the needs of:

a) institutions and companies engaged in an activity of manufacturing, trade, services and research for IT professionals involved in the maintenance / development of IT tools to support this activity at the operational and strategic (planning, management) levels,
b) manufacturers of IT systems for various purposes (designers, programmers, testers, administrators),
c) companies designing, deploying and maintaining computer systems and networks in different departments of enterprises and social organizations, both public and private.

4. List of education modules:

4.1. List of obligatory modules:

4.1.1 List of general education modules

4.1.1.1 *Liberal-managerial subjects* module *(min. ...5... ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	ISZ004307W	Work Safety and Ergonomics	1					K1INF_U14	15	30	1	0,6	T	Z			K	Ob
2	INZ004632W	Social and Law Aspects of Computer Science	2					K1INF_W19, K1INF_K03, K1INF_K05	30	60	2	1,2	T	Z			K	Ob
3	INZ003559W	The Basics of Management	2					K1INF_W18	30	60	2	1,2	T	Z			K	Ob
		Total	5						75	150	5	3						

4.1.1.4 *Information technologies module (min. ..9.. ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ001	Foundations of Programming			1			K1INF_W04,	15	60	2	1,2	T	Z		P	PD	Ob

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

	519L							K1INF_U01, K1INF_U14										
2	INZ001 519Wc	Foundations of (GK)	2	2				K1INF_W04, K1INF_U01	60	120	4	2,4	T	Z		(2)	PD	Ob
3	INZ001 726Cw	Computer Systems Organization (GK)	2	1				K1INF_W08	45	120	3	1,8	T	Z			PD	Ob
		Total	4	3	1				120	300	9	5,4						

Altogether for general education modules

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes[1]
lec	cl	lab	pr	sem				
11	3	1			195	450	14	8,4

4.1.2 List of basic sciences modules

4.1.2.1 *Mathematics* module

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	MAP003055c	Elementary Linear Algebra A		2				K1INF_W01	30	60	2	1,2	T	Z	O		PD	Ob
2	MAP003055W	Elementary Linear Algebra A	2					K1INF_W01	30	60	2	1,2	T	E	O		PD	Ob

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

3	MAP003057c	Mathematical Analysis 1.1 A		2				K1INF_W01	30	60	3	1,8	T	Z	O		PD	Ob
4	MAP003057W	Mathematical Analysis 1.1 A	2					K1INF_W01	30	120	5	3	T	E	O		PD	Ob
5	MAP003059c	Mathematical Analysis 2.4 A		1				K1INF_W01	15	60	2	1,2	T	Z	O		PD	Ob
6	MAP003059W	Mathematical Analysis 2.4 A	2					K1INF_W01	30	60	2	1,2	T	E	O		PD	Ob
7	MAZ001500C	Discrete Mathematics		2				K1INF_W02, K1INF_W17	30	90	3	1,8	T	Z			PD	Ob
8	MAZ001500W	Discrete Mathematics	3					K1INF_W02, K1INF_W17	45	90	3	1,8	T	E			PD	Ob
9	MAZ002519C	Probability Theory and Mathematical Statistics		2				K1INF_W02	30	90	3	1,8	T	Z			PD	Ob.
10	MAZ002519W	Probability Theory and Mathematical Statistics	2					K1INF_W02	30	90	3	1,8	T	E			PD	Ob.
		Total	11	8					285	780	28	16,8						

4.1.2.2 *Physics* module

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	FZP001061C	General Physics 1.1B		1				K1INF_W03	15	30	1	0,6	T	Z	O		PD	Ob.
2	FZP001061W	General Physics 1.1B	2					K1INF_W03	30	120	4	2,4	T	E	O		PD	Ob
3	FZP002079L	General Physics 3.1			1			K1INF_W03,	15	60	2	1,2	T	Z	O	P	PD	Ob

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

								K1INF_U07, K1INF_U14										
		Total	2	1	1				60	210	7	4,2						

4.1.2.4 *Electronics and metrology module*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ001516W	Foundations of Electronics and Metrology	2					K1INF_W08	30	60	2	1,2	T	Z			PD	Ob
2	INZ001516L	Foundations of Electronics and Metrology			2			K1INF_W07, K1INF_U14	30	60	2	1,2	T	Z		P	PD	Ob.
		Total	2		2				60	120	4	2,4						

Altogether for basic sciences modules:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes[1]
lec	cl	lab	pr	sem				
2	1	1			405	1110	39	23,4

4.1.3 List of main-field-of-study modules

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

4.1.3.1 *Obligatory main-field-of-study* modules

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ001 518C	Logic for Computer Scientists		2				K1INF_ W02	30	60	2	1,2	T	Z			K	Ob.
2	INZ001 518W	Logic for Computer Scientists	2					K1INF_ W02	30	90	2	1,2	T	E			K	Ob
3	INZ001 520Wl	Architecture of Computer Systems (GK)	2		2			K1INF_ W08, K1INF_ U06, K1INF_ U14	60	150	5	3		E		(3)	K	Ob
4	INZ001 517Wc	Algorytmy i struktury danych (GK)	2	1				K1INF_ W04	45	120	4	2,4		E			K	Ob
5	INZ001 517L	Algorithms and Data Structures			2			K!INF_U 01, K1INF_ U14	30	90	3	1,8	T	Z		P	K	Ob
6	INZ001 521L	Operating Systems			2			K1INF_ U09, K1INF_ U06, K1INF_ U14	30	60	2	1,2	T	Z		P	K	Ob
7	INZ001 521W	Operating Systems	2					K1INF_ W10	30	60	2	1,2	T	Z			K	Ob
8	INZ001 702C	Foundations of Teleinformatics		2				K1INF_ W11, K1INF_ U07	30	90	3	1,8	T	Z			K	Ob
9	INZ001 702W	Foundations of Teleinformatics	2					K1INF_ W11	30	120	4	2,4	T	E			K	Ob.

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

10	INZ002 553L	Advanced Object Programmimng			1			K1INF_ U02, K1INF_ U14	15	90	3	1,8	T	Z		P	K	Ob.
11	INZ002 553W	Advanced Object Programmimng	2					K1INF_ W05, K1INF_ W06	30	60	2	1,2	T	Z			K	Ob.
12	INZ002 528L	Programming Paradigms			2			K1INF_ U02, K1INF_ U14	30	90	3	1,8	T	Z		P	K	Ob.
13	INZ002 528Wc	Programming Paradigms (GK)	2	1				K1INF_ W05, K1INF_ W06	45	120	4	2,4		E			K	Ob
14	INZ002 556L	System Analysis and Decision Making Techniques in Computer Science		1				K1INF_ W15	15	60	2	1,2	T	Z			K	Ob
15	INZ002 556L	System Analysis and Decision Making Techniques in Computer Science			1			K1INF_ U15, K1INF_ U14	15	60	2	1,2	T	Z		P	K	Ob
16	INZ002 556W	System Analysis and Decision Making Techniques in Computer Science	2					K1INF_ W15	30	90	3	1,8	T	E			K	Ob
17	INZ001 704L	Computer Networks			2			K1INF_ U08, K1INF_ U07, K1INF_ U09, K1INF_ U14	30	90	3	1,8	T	Z		P	K	Ob
18	INZ001 704W	Computer Networks	2					K1INF_ W11	30	90	3	1,8	T	E			K	Ob
19	INZ002 555L	Embedded and Mobile Systems			2			K1INF_ U04, K1INF_ U06, K1INF_ U14	30	60	2	1,2	T	Z		P	K	Ob
20	INZ002 555W	Embedded and Mobile Systems	2					K1INF_ W09	30	60	2	1,2	T	Z			K	Ob

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

[2]Traditional – enter T, remote – enter Z

[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

[7] Optional – enter W, obligatory – enter Ob

21	INZ002 557C	Databases		1				K1INF_ W07, K1INF_ W16	15	30	1	0,6	T	Z		P	K	Ob
22	INZ002 557W	Databases	2					K1INF_ W07, K1INF_ W16, K1INF_ W22	30	60	2	1,2	T	E			K	Ob
23	INZ002 557L	Databases			1			K1INF_ U19, K1INF_ U04, K1INF_ U09, K1INF_ U14	15	60	2	1,2	T	Z		P	K	Ob
24	INZ002 558L	Foundations of Software Engineering			1			K1INF_ U03, K1INF_ U14	15	60	2	1,2	T	Z		P	K	Ob
25	INZ002 558C	Foundations of Software Engineering		1				K1INF_ U03	15	30	1	0,6	T	Z		P	K	Ob
26	INZ002 558W	Foundations of Software Engineering	2					K1INF_ W07	30	60	2	1,2	T	Z			K	Ob
27	INZ003 560W	Process Control Computer Systems	1					K1INF_ W15,K1I NF_W21	15	60	2	1,2	T	E			K	Ob
28	INZ003 560L	Process Control Computer Systems			2			K1INF_ W07, K1INF_ U15, K1INF_ U18, K1INF_ U14	30	60	2	1,2	T	Z		P	K	Ob
29	INZ003 560P	Process Control Computer Systems				1		K1INF_ W07, K1INF_ U15, K1INF_	15	60	2	1,2	T	Z		P	K	Ob

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

								U18, K1INF_ K02										
30	INZ003 561L	Software Design			2			K1INF_ U02, K1INF_ U03, K1INF_ U04, K1INF_ U13, K1INF_ U14	30	60	3	1,8	T	Z		P	K	Ob.
31	INZ003 561W	Software Design	2					K1INF_ W05, K1INF_ W07	30	90	2	1,6	T	E			K	Ob
32	INZ003 562L	Distributed Computer Systems			1			K1INF_ U04, K1INF_ U14	15	60	2	1,2	T	Z		P	K	Ob
33	INZ003 562W	Distributed Computer Systems	2					K1INF_ W12	30	30	1	0,6	T	Z			K	Ob
34	INZ003 563L	Computer Security and Data Protection			1			K1INF_ U03, K1INF_ U09, K1INF_ U14	15	60	2	1,2	T	Z		P	K	Ob
35	INZ003 563W	Computer Security and Data Protection	2					K1INF_ W13	30	30	1	0,6	T	Z			K	Ob
36	INZ003 564L	Data Warehouses			2			K1INF_ U03, K1INF_ U04, K1INF_ U16, K1INF_ U14	30	60	2	1,2	T	Z		P	K	Ob
37	INZ003 564W	Data Warehouses	1					K1INF_ W07, K1INF_	15	30	1	0,6	T	Z			K	Ob

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

[2]Traditional – enter T, remote – enter Z

[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

[7] Optional – enter W, obligatory – enter Ob

								W15, K1INF_W15										
38	INZ003565L	Artificial Intelligence and Knowledge Engineering			2			K1INF_U07, K1INF_U16, K1INF_U14	30	60	2	1,2	T	Z		P	K	Ob
39	INZ003565W	Artificial Intelligence and Knowledge Engineering	2					K1INF_W15	30	60	2	1,2	T	E			K	Ob
40	INZ001748L	Web Systems			1			K1INF_U06, K1INF_U07, K1INF_U14	15	30	1	0,6	T	Z		P	K	Ob
41	INZ001748S	Web Systems					2	K1INF_U05, K1INF_U13	30	60	2	1,2	T	Z			K	Ob
42	INZ001748W	Web Systems	2					K1INF_W14	30	30	1	0,6	T	Z			K	Ob
		Total	36	9	27	1	2		1125	2920	92	55,2						

Altogether (for main-field-of-study modules):

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes[1]
lec	cl	lab	pr	sem				
36	9	27	1	2	1125	2920	92	55,2

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

4.2 List of optional modules

4.2.1 List of general education modules

4.2.1.1 Liberal-managerial subjects modules *(min. ...4... ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1		Humanistic Subject I_1	2					K1INF_W20, K1INF_K03, K1INF_K05	30	60	2	1,2	T	Z	O		K	W
2		Humanistic Subject I_2	2					K1INF_W20, K1INF_K03, K1INF_K05	30	60	2	1,2	T	Z	O		K	W
3		Humanistic Subject II_1	2					K1INF_W20, K1INF_K03, K1INF_K05	30	60	2	1,2	T	Z	O		K	W
4		Humanistic Subject II_2	2					K1INF_W20, K1INF_K03, K1INF_K05	30	60	2	1,2	T	Z	O		K	W
		Total	4						60	120	4	2,4						

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

4.2.1.2 *Foreign languages* module *(min. .....5..... ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	JZL100 400BK	Foreign Language						K1INF_ U17	60	60	2	1,2	T	Z	O		KO	W
2	JZL100 400BK	Foreign Language						K1INF_ U17	60	90	3	1,8	T	Z	O		KO	W
		Total							120	150	5	3						

4.2.1.3 Sporting classes module *(min. ..1.. ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	WFW00 0000BK	Sport						K1INF_ K08	30	30	1	0,6	T	Z	O		KO	W
		Total							30	30	1	0,6						

Altogether for general education modules:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes[1]
lec	cl	lab	pr	sem				
4					240	300	10	6

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

4.2.2 Lista modułów z zakresu nauk podstawowych

4.2.2.1 Moduł *Matematyka* *(min. .... ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
		Total																

4.2.2.2 Moduł *Fizyka* *(min. .... ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
		Total																

4.2.2.3 Moduł *Chemia* *(min. .... ECTS points):*

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
		Total																

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

Altogether for basic sciences modules:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes[1]
lec	cl	lab	pr	sem				

4.2.3 List of main-field-of-study modules

4.2.3.1 Module *M_1: Programming of Internet Applications* (60 hours in semester, 5 ECTS points, 1 course to choose)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ005 200L	Web Programming			2			K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14	30	90	3	1,8	T	Z		P	K	W
2	INZ005 200W	Web Programming	2					K1INF_W05, K1INF_W06, K1INF_W07	30	60	2	1,2	T	Z			K	W
3	INZ005 201L	Programming in the .NET Environment			2			K1INF_U04, K1INF_	30	90	3	1,8	T	Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

								U09, K1INF_ U11,K1I NF_U12, K1INF_ U14										
4	INZ005 201W	Programming in the .NET Environment	2					K1INF_ W05, K1INF_ W06, K1INF_ W07	30	60	2	1,2	T	Z			K	W
		Total	2		2				60	150	5	3						

4.2.3.2 Module *M_2: Multimedai* (60 hours in semester, 5 ECTS points, 1 course to choose)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes [1]			university-wide[4]	practical [5]	kind[6]	type[7]
1	INZ005 202L	Programming of Multimedia Applications			2			K1INF_ U04, K1INF_ U09, K1INF_ U11,K1I NF_U12, K1INF_ U14	30	90	3	1,8	T	Z		P	K	W
2	INZ005 202W	Programming of Multimedia Applications	2					K1INF_ W23	30	60	2	1,2	T	E			K	W
3	INZ003 541L	Digital Media Processing Techniques			2			K1INF_ U04, K1INF_ U09, K1INF_ U11,K1I NF_U12,	30	90	3	1,8	T	Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

[2]Traditional – enter T, remote – enter Z

[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

[7] Optional – enter W, obligatory – enter Ob

								K1INF_U14										
4	INZ003541W	Digital Media Processing Techniques	2					K1INF_W23	30	60	2	1,2	T	E			K	W
5	INZ005232L	Computer Graphics			2			K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14	30	90	3	1,8	T	Z		P	K	W
6	INZ005232W	Computer Graphics	2					K1INF_W23	30	60	2	1,2	T	E			K	W
		Total	2		2				60	150	5	3						

4.2.3.3 Module *M_3: Design of Databases* (minimum 45 hours in semester, 4 ECTS points, 1 course to choose)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ005203W	Database Systems Engineering	1					K1INF_W07, K1INF_W16, K1INF_W22	15	30	1	0,6	T	Z			K	W
2	INZ005203P	Database Systems Engineering				2		K1INF_U03, K1INF_U04, K1INF_U09, K1INF_	30	90	3	1,8	T	Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

								U16 K1INF_ U19										
3	INZ005 204W	Oracle Database - programming	1					K1INF_ W07, K1INF_ W16, K1INF_ W22	15	30	1	0,6	T	Z			K	W
4	INZ005 204P	Oracle Database - programming				2		K1INF_ U03, K1INF_ U04, K1INF_ U09, K1INF_ U16 K1INF_ U19	30	90	3	1,8	T	Z		P	K	W
5	INZ005 205W	Database Languages	1					K1INF_ W07, K1INF_ W16, K1INF_ W22	15	30	1	0,6	T	Z			K	W
6	INZ005 205P	Database Languages				2		K1INF_ U03, K1INF_ U04, K1INF_ U09, K1INF_ U16 K1INF_ U19	30	90	3	1,8	T	Z		P	K	W
7	INZ005 206W	Database System Design	1					K1INF_ W07, K1INF_ W16, K1INF_ W22	15	30	1	0,6	T	Z			K	W
8	INZ005 206P	Database System Design				2		K1INF_ U03,	30	60	3	1,8	T	Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

[2]Traditional – enter T, remote – enter Z

[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

[7] Optional – enter W, obligatory – enter Ob

							K1INF_U04, K1INF_U09, K1INF_U16 K1INF_U19											
		Total	1			2			45	120	4	2,4						

4.2.3.4 Module *M_4: Project Management* (minimum 45 hours in semester, 3 ECTS points, 1 course to choose)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes [1]			university-wide[4]	practical [5]	kind[6]	type[7]
1	INZ005 207W	Introduction to Software Project Management	1					K1INF_W18	15	30	1	0,6	T	Z			K	W
2	INZ005 207L	Introduction to Software Project Management			2			K1INF_U10, K1INF_K02, K1INF_U14	30	60	2	1,2	T	Z		P	K	W
3	INZ005 208W	Process-based IT project management	1					K1INF_W18	15	30	1	0,6	T	Z			K	W
4	INZ005 208L	Process-based IT project management			2			K1INF_U10, K1INF_K02, K1INF_U14	30	60	1,2		T	Z		P	K	W
5	INZ005 209W	IT Project Management Support	1					K1INF_W18	15	30	0,6	1	T	Z			K	W
6	INZ005 209L	IT Project Management Support			2			K1INF_U10, K1INF_	30	60	2	1,2	T	Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

								K02, K1INF_ U14										
		Total	1		2				45	90	3	1,8						

4.2.3.5 Module *M_5: Computer Systems and Networks* (minimum 45 hours in semester, 3 ECTS points, 1 course to choose)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes [1]			university-wide[4]	practical [5]	kind[6]	type[7]
1	INZ005 233W	Administration of Microsoft Systems	1					K1INF_ W10, K1INF_ W11,	15	30	1	0,6	T	E			K	W
2	INZ005 233L	Administration of Microsoft Systems			2			K1INF_ U08,, K1INF_ U09, K1INF_ U14	30	60	2	1,2	T	Z		P	K	W
3	INZ005 234W	Administration of Linux Servers	1					K1INF_ W10, K1INF_ W11,	15	30	1	0,6	T	E			K	W
4	INZ005 234L	Administration of Linux Servers			2			K1INF_ U08,, K1INF_ U09, K1INF_ U14	30	60	2	1,2	T	Z		P	K	W
5	INZ005 236W	Routing and switching in computer networks	1					K1INF_ W10, K1INF_ W11,	15	30	1	0,6	T	E			K	W
6	INZ005 236L	Routing and switching in computer networks			2			K1INF_ U08,,	30	60	2	1,2	T	Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

								K1INF_U09, K1INF_U14										
7	INZ005234W	Unix Network Environment			2			K1INF_U08,, K1INF_U09, K1INF_U14	15	30	1	0,6	T	E			K	W
8	INZ005234L	Unix Network Environment	1					K1INF_W10, K1INF_W11,	30	60	2	1,2	T	Z		P	K	W
		Total	1		2				40	90	3	1,8						

4.2.3.6 Module *M_6: Programming Technologies and Tools* (minimum 45 hours in semester, 3 ECTS points, 1 course to choose)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ005212W	Advanced Programming Techniques in C++	1					K1INF_W05, K1INF_W06	15	30	1	0,6		E			K	W
2	INZ005212L	Advanced Programming Techniques in C++			2			K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14	30	60	2	1,2		Z		P	K	W
3	INZ005213W	Advanced Web Technologies	1					K1INF_W05, K1INF_W06	15	30	1	0,6		E			K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students
[2]Traditional – enter T, remote – enter Z
[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization
[7] Optional – enter W, obligatory – enter Ob

4	INZ005 213L	Advanced Web Technologies			2			K1INF_ U04, K1INF_ U09, K1INF_ U11,K1I NF_U12, K1INF_ U14	30	60	2	1,2		Z		P	K	W
5	INZ005 214W	Advanced Programming Techniques	1					K1INF_ W05, K1INF_ W06	15	30	1	0,6		E			K	W
6	INZ005 214L	Advanced Programming Techniques			2			K1INF_ U04, K1INF_ U09, K1INF_ U11,K1I NF_U12, K1INF_ U14	30	60	2	1,2		Z		P	K	W
7	INZ005 215W	Programming of Mobile Devices	1					K1INF_ W05, K1INF_ W06	15	30	1	0,6		E			K	W
8	INZ005 215L	Programming of Mobile Devices			2			K1INF_ U04, K1INF_ U09, K1INF_ U11,K1I NF_U12, K1INF_ U14	30	60	2	1,2		Z		P	K	W
9	INZ005 216W	Programming of mobile devices in C#	1					K1INF_ W05, K1INF_ W06	15	30	1	0,6		E			K	W
10	INZ005 216L	Programming of mobile devices in C#			2			K1INF_ U04, K1INF_ U09,	30	60	2	1,2		Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

[2]Traditional – enter T, remote – enter Z

[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

[7] Optional – enter W, obligatory – enter Ob

								K1INF_U11,K1INF_U12, K1INF_U14									
11	INZ005 217W	The languages for information modeling and exchange	1					K1INF_W05, K1INF_W06	15	30	1	0,6		E			K	W
12	INZ005 217L	The languages for information modeling and exchange			2			K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14	30	60	2	1,2		Z		P	K	W
13	INZ005 218W	Programming in Linux	1					K1INF_W05, K1INF_W06	15	30	1	0,6		E			K	W
14	INZ005 218L	Programming in Linux			2			K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_U14	30	60	2	1,2		Z		P	K	W
15	INZ005 219W	Advanced Computer Graphics Systems	1					K1INF_W05, K1INF_W06	15	30	1	0,6		E			K	W
16	INZ005 219L	Advanced Computer Graphics Systems			2			K1INF_U04, K1INF_U09, K1INF_U11,K1INF_U12, K1INF_	30	60	2	1,2		Z		P	K	W

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

[2]Traditional – enter T, remote – enter Z

[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

[6] KO – general education, PD – basic sciences, K – field-of-studies, S – specialization

[7] Optional – enter W, obligatory – enter Ob

								U14										
		Total	1		2				60	90	3	1,8						

4.2.3.7 Module *M_10: Emerging Technologies and Paradigms in Informatics* (minimum 60 hours in semester, 4 ECTS points, 1 course to choose)

No.	Course/group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ00522W	Neural Networks	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
2	INZ00522L	Neural Networks			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
3	INZ00523W	Problem solving using metaheuristics	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
4	INZ00523L	Problem solving using metaheuristics			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
5	INZ00524W	Algorithms and techniques of parallel programming	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
6	INZ0	Algorithms and techniques of parallel programming			2			K1INF_U06,	30	60	2	1,2	T	Z		P	K	W

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[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

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[7] Optional – enter W, obligatory – enter Ob

	05224L							K1INF_U07, K1INF_U13									
7	INZ00522 5W	Data Mining	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
8	INZ00522 5L	Data Mining			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
9	INZ00522 6W	Human Computer Interaction	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
10	INZ00522 6L	Human Computer Interaction			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
11	INZ00522 7W	Computer Netowrks II	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
12	INZ00522 7L	Computer Networks II			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
13	INZ00522 8W	SAP Data Warehouses	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
14	INZ00522 8L	SAP Data Warehouses			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
15	INZ0	Network and Internet Systems Security Engineering	2					K1INF_	30	60	2	1,2	T	Z			K	W

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	05229W							W04										
16	INZ005229L	Network and Internet Systems Security Engineering			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
17	INZ005230W	Distributed Databases	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
18	INZ005230L	Distributed Databases			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
19	INZ005231W	Management Information Systems	2					K1INF_W04	30	60	2	1,2	T	Z			K	W
20	INZ005231L	Management Information Systems			2			K1INF_U06, K1INF_U07, K1INF_U13	30	60	2	1,2	T	Z		P	K	W
		Total	2		2				60	120	4	2,4						

4.2.3.8 Elective subjects module (minimum …210… hours in semester, …21…. ECTS points)

No.	Course/ group of courses code	Name of course/group of courses (denote group of courses with symbol **GK**)	Weekly number of hours					Field-of-study educational effect symbol	Number of hours		Number of ECTS points		Form[2] of course/ group of courses	Way[3] of crediting	Course/group of courses			
			lec	cl	lab	pr	sem		ZZU	CNPS	total	BK classes[1]			university-wide[4]	practical[5]	kind[6]	type[7]
1	INZ005210S	Proseminar					2	K1INF_K01, K1INF_	30	60	2	1	T	Z			K	W

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[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
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[7] Optional – enter W, obligatory – enter Ob

								K02, K1INF_ K03, K1INF_ K04, K1INF_ K05, K1INF_ U11, K1INF_ U12, K1INF_ U13										
2	INZ005 211P	Team Engineering Project				4		K1INF_ U02, K1INF_ U05, K1INF_ U06, K1INF_ U10, K1INF_ U12, K1INF_ U13, K1INF_ K01, K1INF_ K03, K1INF_ K04, K1INF_ K05	60	270	4	2,4	T	Z		P	K	W
3	INZ005 220S	Diploma Seminar					2	K1INF_ K01, K1INF_ K02, K1INF_ K03, K1INF_ K04, K1INF_ K05,	30	60	2	1,2	T	Z			K	W

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[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)

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								K1INF_U11, K1INF_U12, K1INF_U13										
4	INZ005 221D	Diploma Thesis				2		K1INF_K01, K1INF_K02, K1INF_K03, K1INF_K04, K1INF_K05, K1INF_U11, K1INF_U12, K1INF_U13	30	390	13	7	T	Z		P	K	W
5		Praktyka studencka									5	0				P		W
		Total				8	2		210	780	26	11,6						

Altogether for main-field-of-study modules:

Total number of hours					Total number of ZZU hours	Total number of CNPS hours	Total number of ECTS points	Number of ECTS points for BK classes[1]
w	ć	l	p	s				
10		12	12	4	540	1590	52	27,8

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[7] Optional – enter W, obligatory – enter Ob

4 Training module (Faculty Council resolution on principles of crediting training – attachment no. …)

Name of training			
Number of ECTS points	**Number of ECTS points for BK classes[1]**	**Training crediting mode**	**Code**
5	**0**	**Z**	

Training duration	Training objective
4 weeks	Familiarization with the professional IT solutions, their designing, programming, deploying and administration of IT companies. Then formulation and implementation of simple engineering tasks to check the previously acquired skills and competences, especially including the teamwork.

4.2 Diploma dissertation module

Type of diploma dissertation	~~Licencjat /~~ inżynier ~~/ magister / magister inżynier~~	
Number of diploma dissertation semesters	**Liczba punktów ECTS**	**Kod**
1	**15**	
Character of diploma dissertation		
Project, computer program		
Number of BK[1] ECTS points	**8**	

5 Ways of verifying assumed educational effects

Type of classes	Ways of verifying assumed educational effects
lecture	e.g. examination, progress/final test
class	e.g. progress/final test
laboratory	e.g. pretest, report from laboratory
project	e.g. project defence

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[3]Exam – enter E, crediting – enter Z. For the group of courses – after the letter E or Z - enter in brackets the final course form (lec, cl, lab, pr, sem)
[4]University-wide course /group of courses – enter O
[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses
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[7] Optional – enter W, obligatory – enter Ob

seminar	e.g. participation in discussion, topic presentation, essay
training	e.g. report from training
diploma dissertation	prepared diploma dissertation

6 **Total number of ECTS points, which student has to obtain from classes requiring direct academic teacher-student contact (enter total of ECTS points for courses/groups of courses denoted with code BK[1])**

…120,8…. ECTS

7. Total number of ECTS points, which student has to obtain from basic sciences classes

Number of ECTS points for obligatory subjects …….	39
Number of ECTS points for optional subjects ….	0
Total number of ECTS points	39

8. Total number of ECTS points, which student has to obtain from practical classes, including laboratory classes (enter total number of ECTS points for courses/group of courses denoted with code P)

Number of ECTS points for obligatory subjects …….	35
Number of ECTS points for optional subjects ….	39
Total number of ECTS points	74

9. Minimum number of ECTS points, which student has to obtain doing education modules offered as part of university-wide classes or other main field of study (enter number of ECTS points for courses/groups of courses denoted with code OG)

…24…. punkty ECTS

[1]BK – number of ECTS points assigned to hours of classes requiring direct contact of teachers with students

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[4]University-wide course /group of courses – enter O

[5]Practical course / group of courses – enter P. For the group of courses – in brackets enter the number of ECTS points assigned to practical courses

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[7] Optional – enter W, obligatory – enter Ob

10. Total number of ECTS points, which student may obtain doing optional modules (min. 30% of total number of ECTS points)
…63…. punkty ECTS

11. Range of diploma dissertation

1. Basic operations on sets, functions and relations. Sentential calculus. Calculus of Predicates.
2. Graphs (basic concepts, spanning tree, Euler and Hamilton cycles, consistency).
3. The concept of the algorithm.
4. Fundamentals of algorithm analysis. Computational complexity.
5. An examples of algorithms. Sorting algorithms, selection, search.
6. Elements of a programming language: variables, data types, expressions, statements and control structures.
7. Object-oriented programming (classes and objects). Inheritance and polymorphism.
8. Basic elements of digital structures.
9. Von Neumann computer architecture.
10. Microcomputers - organization and architecture.
11. Parallel computers architecture.
12. Embedded systems architecture. Designing of embedded systems. MHP design environment.
13. Information systems models (general- and specific-purposes systems).
14. Local and wide area networks – topological structures.
15. Reference models of computer networks (Open System Interconnection/International Standard Organization and Transport Control Protocol/Internet Protocol models).
16. Protocols of computer networks.
17. Data link layer protocols. Ethernet. TCP/IP protocols stack.
18. Client-server model. Http protocol.
19. Transmission channels and their organization for information transmission purposes.
20. Websites and web application programming language.

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21. Distributed systems.
22. Communication in distributed systems.
23. Algorithms for data exchange. Mechanisms of the implementation of distributed services.
24. Inter process communication (IPC).
25. Software development methodology.
26. Structural and object-oriented software design.
27. Models of software life cycle.
28. UML as a language of design specifications.
29. Design patterns.
30. Project Management - the structure of work, planning, scheduling, monitoring and quality.
31. Artificial intelligence - basic concepts, area of studies, areas of application.
32. Database models. A relational database. Normalization. Transactions.
33. Basics of SQL.
34. Basics of database and data warehouses design.
35. Mechanisms of knowledge processing in expert systems
36. Operating system.
37. The layered structure of the operating system.The concept of the system kernel.
38. Computer and Network Security.
39. Security models. Information flow model. Security of IP and IP v6 protocol.
40. Structure and properties of control systems. Typical control algorithms. Construction and structure of a typical computer control systems.
41. Static object identification algorithms. Analytical and numerical methods of optimization.

12. Requirements concerning deadlines for crediting courses/groups of courses for all courses in particular modules

No.	*Course code*	*Name of course*	*Crediting by deadline of...*

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[7] Optional – enter W, obligatory – enter Ob

			(number of semester)
1	FZP001061C	General Physics 1.1B	6
2	FZP001061W	General Physics 1.1B	6
3	INZ001513L	Foundations of Programming	3
4	INZ001518C	Logic for Computer Scientists	5
5	INZ001518W	Logic for Computer Scientists	5
6	MAP001140C	Elementary Linear Algebra A	5
7	MAP001140W	Elementary Linear Algebra A	5
8	MAP001142C	Mathematical Analysis 1.1 A	3
9	MAP001142W	Mathematical Analysis 1.1 A	3
1	INZ001513Wc	Foundations of Programming (GK)	3
2	INZ001726Cw	Computer Systems Organization (GK)	3
1	FZP002079L	General Physics 3.1	6
2	INZ001516W	Foundations of Electronics and Metrology	6
3	INZ001517L	Algorithms and Data Structures	6
4	INZ001701L	Operating Systems	6
5	INZ001701W	Operating Systems	6
6	MAP001146C	Mathematical Analysis 2.4 A	5
7	MAP001146W	Mathematical Analysis 2.4 A	5
8	MAZ001500C	Discrete Mathematics	5
9	MAZ001500W	Discrete Mathematics	5
1	INZ001515Wl	Architecture of Computer Systems (GK)	6
2	INZ001517Wc	Algorithms and Data Structures (GK)	6
1	INZ001702C	Foundations of Teleinformatics	6
2	INZ001702W	Foundations of Teleinformatics	6
3	INZ002553L	Advanced Object Programming	6
4	INZ002553L	Advanced Object Programming	6
5	INZ002528L	Programming Paradigms	6
6	INZ002531L	Foundations of Electronics and Metrology	6
7	MAZ002519C	Probability Theory and Mathematical Statistics	5
8	MAZ002519W	Probability Theory and Mathematical Statistics .	5
1	INZ002528Wc	Programming Paradigms(GK)	6
1	JZL100400BK	Foreign Language	6
2	WFW000000BK	Sport	6
1	INZ001703C	System Analysis and Decision Making Techniques in Computer Science	6

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2	INZ001703L	System Analysis and Decision Making Techniques in Computer Science	6
3	INZ001703W	System Analysis and Decision Making Techniques in Computer Science	6
4	INZ001704L	Computer Networks	6
5	INZ001704W	Computer Networks	6
6	INZ002555L	Embedded and Mobile Systems	6
7	INZ002555W	Embedded and Mobile Systems	6
8	INZ002529C	Databases	6
9	INZ002529W	Databases	6
10	INZ002529L	Databases	6
11	INZ002530L	Foundations of Software Engineering	6
12	INZ002530C	Foundations of Software Engineering	6
13	INZ002530W	Foundations of Software Engineering	6
1	JZL100400BK	Foreign Language	6
1	ZMZ003456W	The Basics of Management	6
2	INZ001706W	Process Control Computer Systems	6
3	INZ001706L	Process Control Computer Systems	6
4	INZ001706P	Process Control Computer Systems	6
5	INZ003543L	Software Design	6
6	INZ003543W	Software Design	6
1	INZ001710L	Distributed Computer Systems	6
2	INZ001710W	Distributed Computer Systems	6
3	INZ001709L	Computer Security and Data Protection	6
4	INZ001709W	Computer Security and Data Protection	6
5	INZ001708L	Data Warehouses	6
5	INZ001708W	Data Warehouses	6
7	INZ003545L	Artificial Intelligence and Knowledge Engineering	6
7	INZ003545W	Artificial Intelligence and Knowledge Engineering	6
1	INZ001715L	Web Systems	7
1	INZ001715S	Web Systems	7
1	INZ001715W	Web Systems	7
4	ISZ004307W	Work Safety and Ergonomics	7

13. Plan of studies (attachment no. 1)

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[7] Optional – enter W, obligatory – enter Ob

Approved by faculty student government legislative body:

....
Date, name and surname, signature of student representative

....
Date, Dean's signature

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