Annex no. 1 to Resolution No. 67/2019
of the Presidium of the Polish
Accreditation Committee
of 28 February 2019

General Academic Profile

Report of the Assessment Panel of the Polish Accreditation Committee

Name of the degree programme: Computer Science

Name and registered seat of the higher education institution providing the degree programme: Warsaw School of Computer Science

Date of staging the site visit: 25-26 October 2019

Warsaw, 2019

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1. Information about the visit and its course;

1.1. Composition of the Polish Accreditation Committee's assessment panel

Chair: Jan Ogonowski, BEng, PhD, DsC, ProfTit, PKA member;

Members:

1. Jarosław Stepaniuk, BEng, PhD, DsC, ProfTit, PKA expert
2. Jerzy Świątek, BEng, PhD, DsC, ProfTit, PKA expert
3. Agnieszka Kozera, MSc, assessment panel secretary
4. Waldemar Grądzki, PKA member, employers' representative
5. Sara Zemczak, PKA expert, students' representative

1.2. Information about the assessment process;

The assessment of the quality of education in the computer science degree programme with a general academic profile, provided by the Warsaw School of Computer Science, was carried out on the initiative of the Polish Accreditation Committee as part of the work schedule specified by the Committee for the academic year 2019/20. It was the third site visit to assess this degree programme.

The site visit was prepared and carried out in accordance with the existing procedure. The Polish Accreditation Committee Assessment Panel got acquainted with the self-assessment report submitted by the School Authorities. Then its members had an organizational meeting with the School and evaluated study programme Authorities to discuss the issues presented in the report, matters requiring clarification, and a detailed schedule of the visit. The site visit included meetings with students, academic teachers, persons responsible for the functioning of the internal Education Quality Assurance System, supervising the degree programme and internships, as well as representatives of the Student Government and the Career and Internship Office. In addition, selected diploma theses and mid-term works were reviewed, classes were inspected and the didactic and social base was assessed. Next, the degree of fulfilment of the criteria was estimated. Finally, comments and recommendations were formulated and conveyed by the Panel Chairman and experts to the School Authorities at the summary meeting.

Legal basis for the assessment is mentioned in Annex 1, and a detailed schedule of the site visit, including the division of tasks between individual members of the assessment panel, is mentioned in Annex 2.

2. Basic information about the degree programme and the study programme being assessed

Name of the degree programme	Computer Science
Cycle of studies (First-cycle, second-cycle, long-cycle programme)	first-cycle / second-cycle
Study profile	general academic
Mode of studies (full-time/part-time)	full-time / part-time

Name of the discipline, to which the degree programme has been assigned[1,2]	Information and communication technology	
Number of semesters and number of ECTS credits required to complete the degree programme at a given cycle specified in the study programme	first-cycle: 7 semesters and 215 ECTS points second-cycle: 4 semesters and 120 ECTS points	
Total number of hours/ of ECTS credits assigned to student placements (if the study programme of the degree programme provides for student placements)	first-cycle: 320/6 ECTS points second-cycle: 160/5 ECTS points	
Specialities/ Specialisation tracks offered as part of the degree programme	first-cycle: ICT Network Engineering Information Systems Security Engineering Database Systems Engineering Software Engineering Multimedia Engineering Internet Engineering Data Science second-cycle: Mobile Systems Information Technologies Project Management Big Data & Business Analysis Cloud Computing	
identification of the degree awarded to graduates	first-cycle: Bachelor of Engineering second-cycle: Master of Engineering	
	Full-time programmes	**Part-time programmes**
Number of students of the degree programme	first-cycle: 290 second-cycle: 20	first-cycle: 1037 second-cycle: 120
Number of hours of classes with direct participation of academic teachers or other persons teaching courses and students	first-cycle: 2705 second-cycle: 1465	first-cycle: 1841 second-cycle: 943
Number of ECTS credits covered by the study programme to be earned as part of the courses taught with the direct participation of academic	first-cycle: 108 second-cycle: 60	first-cycle: 74 second-cycle: 38

1 If the degree programme is assigned to more than one discipline, the name of the leading discipline, under which more than one half of learning outcomes are achieved, with specifying the percentage share of ECTS credits of the leading discipline in the total number of ECTS credits required to complete the programme.

2 Names of the disciplines should be given in accordance with the Regulation of the Ministry of Science and Higher Education of 20 September 2018 on the fields of science and scientific disciplines and artistic disciplines (Journal of Laws of 2018, item 1818).

teachers or other persons teaching courses and students		
Total number of ECTS credits assigned to courses related to academic activity of the HEI in the discipline(-s) to which the degree programme is assigned	first-cycle: 159 second-cycle: 115	first-cycle: 159 second-cycle: 115
Number of ECTS credits covered by the study programme obtained within the framework of optional courses	first-cycle: 67 second-cycle: 55	first-cycle: 67 second-cycle: 55

3. Description of the fulfilment of detailed criteria for programme assessment and education quality standards

Criterion 1. Structure of the study programme: concept of education, learning objectives and outcomes

Analysis of actual facts and the assessment of the degree of satisfying Criterion 1.

The main strategic goal of first- and second-cycle studies at the Warsaw School of Computer Science is to equip students with both theoretical and practical knowledge in the field of computer science, acquaint them with the latest scientific achievements and teach them research skills so that they could obtain employment consistent with their qualifications, expectations and predispositions, as well as with the Polish and international job market demand.

The concept of computer science education comprises the main goals and strategies of the Warsaw School of Computer Science and is based on the following principles:

- scientific and research works conducted at the School are key tools for formulating and improving the concept of education, particularly for modifying the structure and content of education programmes, evaluation of learning outcomes and formulating the degree programme profiles;
- adapting the educational content, methods and conditions to the students' needs and abilities;
- due diligence with regard to the level of quality, modernity and innovation of the programme and educational process, as well as the conditions in which it is implemented;
- maintaining the right balance between general (theoretical) and specialist (practical) knowledge;
- diversity and flexibility of the educational programme;
- internationalization of education;
- concept availability in the public information system.

The concept of education highlights trends in the development of computer sciences, as well as trends and demand on the job market. The curriculum content is also based on the results of global scientific research concerning i.a. analysis and design of algorithms for selected problems of discrete optimization and operational research, architecture of applications and computer systems (particularly applications and parallel / distributed systems), software engineering (with particular emphasis on agile methodologies and IT system security issues), data processing and analysis

(especially Big Data analysis for business purposes), mechanisms of natural human interaction with the system, three-dimensional modelling and spatial data visualization for applications in interactive GIS systems, technologies and mobile applications, as well as computer networks.

The adopted education concept assumes providing students with comprehensive knowledge and educating an IT specialist with a Bachelor of Engineering degree in first-cycle studies and a Master of Engineering degree in second-cycle studies. It also comprises cooperation with the socio-economic environment of the School. Great emphasis is placed on cooperation with both external and internal stakeholders in defining, updating and implementing the curriculum content and learning outcomes. External stakeholders participate in the planning and development of the education concept. There is a Council at the Warsaw School of Computer Science, whose goal is to shape mutual relations and define forms of cooperation in accordance with the needs of the socio-economic environment and the School mission. Representatives of companies such as NASK, IBM, Cisco, Microsoft, Oracle or HP belong to the Council. The Council impacts on the education process by influencing the modification of study programmes in line with the learning outcomes expected by employers and other stakeholders.

The concept and objectives of education in the field of computer science at both study cycles fall into the discipline of information and communication technology. First-cycle studies last seven semesters, both in full-time and extramural form (215 ECTS credits). There are several diploma profiles offered at first-cycle studies: ICT Network Engineering, Information Systems Security Engineering, Database Systems Engineering, Software Engineering, Multimedia Engineering, Internet Engineering and Data Science.

A graduate from the first-cycle studies in computer science has knowledge and skills in the field of mathematics, physics and general technical rudiments of computer science, as well as additional knowledge and technical skills in the field of information systems. He is able to analyse computer algorithms, knows the architecture of modern computers and cooperating devices, operating systems, computer networks, databases and embedded systems. A graduate from these studies has knowledge and skills in the field of technology which enable him to produce distributed internet applications and solve information systems security problems. He has the ability to program computers using various programming environments and knows the principles of software engineering to the extent that enables his effective work in programming teams. He also has some basic knowledge in the field of artificial intelligence, computer graphics and human-computer communication. He knows a foreign language at least at B2 level according to the Council of Europe's Common European Framework of Reference for Languages and is able to use specialized language in the field of computer science. He can use his knowledge and skills in his professional work retaining legal and ethical principles and with the awareness of social problems caused by computerization. The educational process addresses aspects of the practical use of acquired knowledge and business aspects related to the broadly understood implementation of IT projects.

Second-cycle studies last four semesters both in full-time and extramural form (120 ECTS credits). There are several specializations on offer: Mobile Systems, Information Technologies, Project Management, Big Data & Business Analysis and Cloud Computing.

A graduate from the second-cycle studies has general IT knowledge and extended knowledge in the field of operational research, information society technologies, high performance computing systems, global information infrastructure, information systems modeling and simulation and elements of bioinformatics. His knowledge and skills in the field of applied computer science as well

as case studies on selected IT projects allow him to solve IT problems in non-standard situations and issue opinions based on incomplete or limited information, retaining legal and ethical principles. He possesses adequate skills to work in IT companies, research and development centres and in local or state administration.

The first- and second-cycle education programmes are in line with international guidelines in the field of IT studies, namely Computer Engineering Curricula ACM and IEEE Computer Society. Therefore, it can be concluded that the education concept takes into account the internationalization of the education process and the progress in the discipline of computer science, from which the course originates.

To sum up, the education concept behind the evaluated degree programme and plans for its development are in line with the mission and development strategy of the Warsaw School of Computer Science. It takes into account the progress in the discipline of information and communication technology , to which the field of study has been assigned. Moreover, it is oriented to the needs of the environment, in particular the job market.

Learning outcomes for first- and second-cycle studies in computer science with a general academic profile refer to the discipline of information and communication technology, to which this field of study has been assigned. Specialization learning outcomes are in line with the education concept, learning objectives and general academic profile, and correspond to levels 6 and 7 of the Polish Qualifications Framework.

Specialization learning outcomes in the first-cycle studies

- As for knowledge, the student knows and understands at an advanced level issues related to:
  - mathematics to the extent necessary to formulate and solve simple problems related to computer science,
  - construction and operation principles of components and systems related to computer science, including theory, methods and complex relationships between them,
  - programming principles , methods and techniques, and rules for creating computer software or programming devices and controllers which use microprocessors,
  - processes occurring in the life cycle of devices, objects and systems specific for information technology,
  - methods of data processing, storage and transmission, including computational algorithms, artificial intelligence and data mining ,
  - design principles and hardware and software support methods for local and distributed IT systems, databases, computer networks and information applications,
  - the principles of human cooperation with a computer and computer-aided teamwork,
  - advanced levels of IT systems standards and methods.
- In terms of skills, the student is able to:
  - use his mathematical knowledge in formulating and solving complex problems related to the field of study,
  - design - in accordance with the given specification - and make a simple device / object / system typical for the field of study or implement a process using appropriately selected methods, techniques, tools and materials, in compliance with the engineering standards and norms, applying technologies appropriate for the field of study and using experience gained in professional engineering environment,

- use his knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools to design computer software,
- analyse the operation of elements and systems related to the field of study, measure their parameters and examine their technical characteristics,
- develop, test or evaluate software using modern platforms, tools, languages and programming paradigms of various levels,
- use software packages supporting scientific research, business decision-making processes and teamwork,
- analyse data and formulate, apply and evaluate the appropriate formal models and problem solving algorithms for information systems and applications.

- In the field of social competences, the student is ready to:

fulfil social obligations,

- co-organize activities for the social environment,
- initiate actions for the public interest,
- think and act in an entrepreneurial manner,
- cooperate in an international student team,
- critically assess his knowledge,
- recognize the importance of knowledge in solving cognitive and practical problems.

Specialization learning outcomes in the second-cycle studies

- As for knowledge, the student knows and understands at an advanced level selected issues from the field of computer science concerning:
  - advanced algorithms and programming methods,
  - operating systems,
  - network technologies,
  - graphics and multimedia basics,
  - databases,
  - embedded systems,
  - digital security basics,
  - elements of IT and ICT systems administration and management,
  - IT systems modelling,
  - ICT basics,
  - data analysis and processing,
  - artificial intelligence
  - and selected IT applications.
- In terms of skills, the student is able to:
  - obtain information from literature, databases and other sources,
  - integrate, interpret and critically evaluate the information obtained,
  - draw conclusions, as well as formulate and comprehensively justify his opinions,
  - work individually and in a team,
  - make time estimations,

- manage a small team in a way that ensures the implementation of the task within the set deadline,
- prepare detailed documentation of experiment /project / research results, as well as a study containing the discussion of these results,
- prepare and give a presentation on the implementation of a project or research task and conduct a discussion concerning the presentation.

- In the field of social competence the student is able to:
  - critically assess his knowledge and received information,
  - seek expert opinions,
  - learn continuously,
  - inspire and organize the learning process for others,
  - analyse non-technical aspects of IT engineer activities, including their impact on the environment, and consequently make responsible decisions,
  - fulfil social commitments,
  - cooperate and work in a team, assuming various roles in it,
  - set priorities for effective implementation of his own or a given task.

The specialization learning outcomes include practical knowledge of a foreign language (K_U06: use English at B2 level to read and understand texts and programme descriptions, and K2_U0S: use English at B2 + level, also in professional matters, to read and understand professional literature, as well as prepare and deliver a short presentation on the implementation of a project or research task). The specialization learning outcomes are consistent with the current state of knowledge in the discipline to which the course is assigned, the scope of scientific activity of the university in this discipline, as well as the practice of an IT professional and the IT labour market.

The key engineering competences defined as part of the learning outcomes for first- and second-cycle studies are associated with typical expectations and demand on the labour market. The learning outcomes adopted for the assessed field of study take into account the full range of outcomes for studies with a general academic profile aimed at gaining engineering competences.

The learning outcomes adopted for the computer science study programme are in line with employers' expectations. It was confirmed during the meeting of the PKA Assessment Panel with the representatives of the socio-economic environment. The learning outcomes include acquiring by students the skills needed for professional activity corresponding to computer science studies, as well as social competences necessary on the labour market or in further education. The defined learning outcomes are achievable and verifiable.

The PKA Assessment Panel also evaluated the coherence of detailed learning outcomes defined for the modules that make up the study programme, including apprenticeships, with the learning outcomes specified for the assessed specialization . As a result of the analysis carried out on the basis of selected syllabuses, no deficiencies were found in the determination of the module learning outcomes, their links with the specialization learning outcomes, education content, as well as the forms of activities in which they are achieved.

The analysis of the specialization and module learning outcomes leads to the positive assessment of the coherence of the specific learning outcomes defined for the modules which constitute the study programme , including internships with the learning outcomes specified for the assessed specialization. The PKA Assessment Panel positively assessed the real possibility for the students to

achieve the learning outcomes specified both for the modules included in the study programme and for the evaluated study profile .

The analysis of the key competences of a computer science graduate indicates that they are consistent with the current state of knowledge in the discipline of computer science and enable students to continue their education at higher levels of study. The learning outcomes assume that students acquire both engineering competences (applied skills) at the appropriate level as well as scientific competences (research skills).

Proposal for the rating describing the degree of satisfying criterion 1.[3] (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled

Justification

The education concept and objectives are in line with the strategy of the Warsaw School of Computer Science and fall into the field of engineering and technology and the disciplines of information and communication technology. They take into account the progress in the areas of scientific activity relevant to the evaluated studies and are oriented to the needs of the socio-economic environment, in particular the professional labour market. The education concept and objectives were defined in cooperation with internal and external stakeholders. Specialization learning outcomes are consistent with the education concept and objectives, the general academic profile and the relevant level of the Polish Qualifications Framework. They take into account, in particular, communication skills in a foreign language and social competences necessary for research and professional activities appropriate to the evaluated specialization. The assumed learning objectives are achievable, verifiable and contain a full range of outcomes for studies aimed at gaining engineering competences.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations

None

Criterion 2. Implementation of the study programme: programme contents, timetable for the implementation of the study programme, forms and organisation of classes, methods of education, student placements, organisation of the teaching and learning process

Analysis of actual facts and the assessment of the degree of satisfying Criterion 2.

First-degree studies last seven semesters, both in full-time and extramural form (215 ECTS credits). At the first-cycle studies, several diploma profiles are offered: ICT Network Engineering, Information Systems Security Engineering, Database Systems Engineering, Software Engineering, Multimedia Engineering, Internet Engineering and Data Science. At second-cycle full-time studies (four

3If the proposal for the ratings for individual cycles of studies vary, you should quote the rating for each individual cycle.

semesters, 120 ECTS credits) the following specialities are offered: ICT Systems, Information Technologies , Project Management, Big Data & Business Analysis and Cloud Computing.

The first-cycle computer science study programme comprises general profile subjects, basic and major, as well as specialization subjects, whereas the second-cycle studies computer science study programme consists of specialisation modules meant to broaden students' knowledge and develop their social skills and competences useful in scientific and research work.

The first- and second-cycle study programmes include classes related to the scientific activity conducted at the School in the field of information and communication technology (159 ECTS credits at the first-cycle studies). The programme content of all subjects at the second-cycle studies is related to the scientific activity carried out at the School in the field of engineering and technology , and the discipline of information and communication technology.

The PKA Assessment Panel positively assesses the modules related to the research conducted at the School in the discipline of information and communication technology, which the learning outcomes assumed for the evaluated specialisation refer to. There is compliance of the programme content with the current state of knowledge and research practice in the field of computer science.

◦ The offer of choosable subjects meets the requirements set out in the legal provisions, i.e. the study programme allows the student to choose classes to which ECTS points have been assigned. They should constitute of not less than 30% of the number of ECTS points necessary to obtain qualifications corresponding to the level of education.

Appropriate proportions of teaching hours with the direct participation of the academic teacher are maintained. They constitute more than half of all hours in the study programme. The total number of 2705 hours in the first-cycle studies and 1465 hours in the second-cycle studies guarantees the possibility of achieving the learning outcomes specified for the evaluated degree programme, as well as the implementation of the education contents when students incur the workload measured by the number of ECTS points assigned to the study programme of the assessed specialization and the individual subjects.

The hourly dimension of individual subjects was correctly determined. The key content of the computer science study programme allows to direct the student's development, adapting it to his participation in the economic and industrial environment and the society. The programme content is regularly updated and thus adapted to the current state of knowledge in the field of computer science. Before the beginning of each semester, teachers update the curriculum content of their modules and the list of literature on the subject.

The updating of programme content is an ongoing process and is carried out by teachers through contacts with industry representatives, as well as the implementation of the scientific research and diploma works of their students. The programme content implemented as part of the reviewed study programme also meets the needs of the labour market, in particular in the area of selected IT applications. The correctness of formulating the modules within the study programme and their educational content raise no objections.

The appropriate number of hours devoted to each module , the proper choice of the form the classes take, and correct proportions between them, as well as good estimation of the workload necessary to achieve the learning outcomes for a given module, measured by the number of ECTS points, ensure that students achieve the learning outcomes. At the meeting of the PKA Assessment Panel with computer science students, the students positively assessed the numbers of ECTS points

assigned to individual modules as properly reflecting their workload necessary to achieve the assumed learning outcomes.

The sequence of modules in the first- and second-cycle studies does not raise any objections. The list of learning outcomes in individual subjects indicates that students w become familiar with the problems discussed in class and acquire knowledge, practical skills and social competences in the correct order. Consequently, the PKA Assessment Panel regard the study programme as properly structured.

Classes taught in the computer science studies and aimed at providing students with engineering competences take place in the work environment of an engineer or a master engineer and enable students to perform practical tasks. The key education contents relate to the discipline of information and communication technology, relevant to the study programme, as well as to engineering science.

To sum up, according to the PKA Assessment Panel the programme contents for the evaluated studies, the forms of classes, the duration of education, as well as the estimated student workload, measured by the number of ECTS points, allow students to achieve the assumed learning outcomes and obtain qualifications corresponding to the level of education. The timetable (module sequence) is properly structured.

The evaluated study programme uses standard educational methods which include lectures, classes, labs, seminars, and projects aimed at providing students with engineering competences and research skills. The teaching methods enable students to achieve their learning outcomes and comprise student self study and activation techniques.

Computer science students at first-cycle studies are prepared to conduct scientific research as part of the undergraduate thesis seminar, prepare engineering thesis and laboratories. Certain issues related to the methodology of scientific research are also discussed during lectures and practical classes . On admission students undergo general OHS training, and in the case of practical classes, during the first meeting they are acquainted with the regulations applicable in a given laboratory and the rules for using special equipment.

While discussing the teaching methods, the Moodle platform used at the Warsaw School of Computer Science is worth mentioning. By means of this tool both teachers and students have access to information about given courses and to materials supporting the teaching process (lecture slides, scripts, supporting materials). The Moodle platform is also a convenient form of fast communication between lecturers and students. For some courses, this platform supports project implementation and examination. In the case of projects, students upload files which document the implementation of various stages of their work, and the teacher can thus supervise their timely performance. Distance learning methods and techniques are also used.

Classes, practical classes and labs are conducted in small groups and enable students to think, act and do research independently, as well as develop necessary engineering, social and so called soft skills, both personal and interpersonal (e.g. ability to work in a group, time management, compliance with the principles of professional ethics or independent and creative task performance). Students have the opportunity to work in task teams (e.g. group projects), in Group Project classes and during the implementation of their undergraduate thesis topics. The forms of classes allow students to achieve practical skills, such as comparison and evaluation of existing technical solutions (design classes, seminars, engineering projects), preliminary estimation of cost effectiveness (business analysis) of the chosen engineering solutions (classes), the use of analytical methods , simulation and

experiment to formulate and solve simple engineering tasks. The accuracy of the selection and the variety of forms of the classes, the number of hours intended to these forms in the timetable, the number of students in relation to the types of classes, the assumed educational profile and learning outcomes, as well as the possibility of achieving them by students are not objectionable.

Students have the appropriate opportunities to adapt the learning process to their diverse needs. The procedure of applying for an Individual Curriculum is governed by § 17 of the WSCS Study Regulations. This form of individual obtaining of the assumed learning outcomes is intended for students who bring off outstanding scientific achievements, as well as those in exceptional life circumstances, such as pregnancy, working life or chronic illness. In order to obtain the Individual Curriculum due to scientific achievements, the student has to complete the first year of study, obtain the GPA of 4.0 and demonstrate aptitude for a given discipline. If all formal conditions are met and the individual programme is approved the Rector gives his consent to the Individual Curriculum. During the meeting with the PKA Assessment Panel, students expressed a positive opinion about the existing forms to individualize the study programme.

The flexibility of the teaching methods enables the adaptation of the learning process to the diverse needs of individual students, student groups, and students with disabilities, as well as the implementation of individual learning paths. The support provided to students by academic teachers should also be assessed positively.

Summing up this aspect of assessment, the PKA Assessment Panel state that the education methods are diverse, student-oriented, motivate students to be independent and take active part in the learning process, enable them to achieve all the learning outcomes, including in particular the preparation for conducting scientific research in the first-cycle studies and participation in scientific research in the second-cycle studies in information and communication technology. The positive opinion applies both to the methods of verification of the learning outcomes obtained in the field of engineering competences, as well as the skills necessary for scientific research.

The study programme includes student placements, implemented in cooperation with numerous institutions and enterprises. It gives the possibility of proper selection of internships, as well as the verification of selected learning outcomes, especially practical skills and social competences.

During the internships, students have the opportunity to broaden their knowledge, acquire practical skills, work in a group and strengthen interpersonal communication skills.

Student placements are compulsory during first- and second-cycle studies, both full-time and part-time. Internships during first-cycle studies last 8 weeks (as mid-term internships) and are divided into stages. The first stage includes an internship in upper secondary schools, which lasts 120 hours in the 3rd and 4th semesters, while the second stage includes internships in offices and IT departments of various companies and public institutions, which are carried out for 200 hours in the 5th, 6th and 7th semesters. Internships last 320 hours altogether and give a student 6 ECTS points. Each student of the second-cycle studies is also obliged to take part in student work placement. It lasts 160 hours in the 2nd and 4th semesters, and on its completion a student receives 5 ECTS points.

The rules and forms of internships are defined in the university internal legal acts (the WSCS Study Regulations and the WSCS Internship Regulations - Rector's Regulation No. 9/2018/2019 of September 30, 2019). At a student’s request, the internship can also be credited on the basis of professional work, if the performed business activities enable the student to obtain the learning outcomes assumed for the internship. The student is required to obtain internship credits by the end

of the 7th semester at first-cycle studies the latest, and not later than by the end of the 4th semester at the second-cycle studies.

Students usually independently and actively look for a place to do internships. In case of any problems with finding a workplace interested in the co-operation, the WSCS supports students with a list of companies and institutions contracted to implement the internship programme. After a student chooses the place of internship, the Rector's Proxy for trainings and professional internships assesses and approves this place on the basis of specific and formally adopted quality criteria (included in the provisions of the above-mentioned WSCS Internship Regulations).

The Rector's Proxy and the President of the WSCS inspected students' workplaces (e.g. Radio Poland, Municipal Data and Network Centre in Warsaw, Technical and General Education School Complex No. 1 in Warsaw), where they assessed the equipment and professional qualifications of the technical staff. Since students have been doing internships mostly in the same offices, manufacturing companies and public institutions that have been cooperating with the WSCS for many years, there is no need for constant verification of their technical infrastructure and staff.

Student placements are carried out at workplaces whose activity profiles meet the objectives of the internship programme. Information how to organise and undertake student internships is available on the School website. The companies which the WSCS has contracted to do student apprenticeships are usually the largest IT enterprises and corporations (INTEL, Cisco, IBM, HP, Oracle, Asseco Poland, Dell and others). It should be noted that the technical infrastructure they provide meets the requirements of the teaching and learning process, and also enables students to achieve the learning outcomes and complete their internships successfully.

In the initial phase of internships, students undergo OHS training and special on-the-job training. Throughout their work placements, students have the support of experienced employees. The location of internships is usually related to the students' place of residence or stay during the internships.

On analysing the selection of student placements offered by the WSCS, the PKA Assessment Panel states that their technical infrastructure meets the requirements of the teaching and learning process and enables students to achieve the learning outcomes and complete their internships successfully.

The analysed documentation concerning internships(e.g. internship referrals, the Framework Internship Programme, agreements between the WSCS and workplaces, employment certificates, student internship reports) is managed correctly. The analyzed documents contain the precise place and time of the internships, the workplace description, the scope of tasks performed by the student in particular weeks as well as the opinion of the internship supervisor. It should be emphasized that a successfully completed internship in computer science improves student's organisational skills, teamwork, time management, conscientiousness and responsibility for the tasks entrusted. The internship at the WSCS last 320 hours at the first-cycle studies which is twice longer than at other universities offering computer science degree programme with a general academic profile. The compulsory work placements introduced at the second-cycle studies have a positive impact on the verification of students' practical skills and give them the opportunity to find a desired employer faster.

It is the student and the internship supervisor at the given workplace who are responsible for the student internship report and its compliance with the internship programme (determined individually between the student and the workplace, in accordance with the workplace production /

service profile). The internship supervisor prepares also a written opinion on the course of the internship and the learning outcomes achieved by the student. The assessment is comprehensive and addresses each of the assumed learning outcomes. The competences, experience and qualifications, as well as the number of internship supervisors guarantee the proper internship execution.

To sum up, it should be noted that the learning outcomes assumed for the internships are consistent with the learning outcomes assigned to other modules or module groups. The internship programme content and their place in the study programme ensure that students achieve the learning outcomes.

According to the PKA Assessment Panel, the student placement programme enables students to achieve the assumed learning outcomes, and the results achieved during internships are subject to systematic assessment carried out with the students' participation. This assessment is used in the continuous improvement of the internship programme.

In order to improve the internship execution, the PKA Assessment Panel recommends the following:

1. to round out the form entitled *Internship Report* (Annex 15 to the WSCS Internship Regulations) in such a way that it takes into account the possibility of expressing the student's opinion on the implementation of the student placement programme and contains his conclusions and observations that could contribute to improving the internship execution,
2. to achieve comparability of the number of ECTS points for the first- and second-cycle studies, because currently for a three-stage internship which lasts 320 hours at the first cycle studies the student receives only six ECTS points, whereas 160 hours of internship at the second-cycle studies give him five ECTS points.

Good scheduling allows students to effectively use the time spent on classes and self-study. General rules for checking and assessing the extent of achieving the learning outcomes for various forms of classes in terms of knowledge, practical skills and social competences enable teachers to evaluate systematically the level of knowledge and skills achieved by the student in each subject. The system of learning outcomes verification which is used in the assessed study programme ensures proper monitoring of learning progress as well as a reliable and credible assessment of the degree of achieving by students the assumed learning outcomes. Students are informed about the criteria and assessment methods during the first class of a given subject and receive feedback on the results of checking and assessing their achieved learning outcomes (grades earned by students from tests, exams and projects).

Students usually receive information on their results within seven days from the date of the exam and the exact time depends on the form of the results verification. If students have any doubts concerning their grades, they report them directly to the teacher. They are allowed to view their corrected exams and obtain all information about their grades within 14 days from the announcement of the results.

The support provided to students in the educational process by academic teachers in the form of discussing test and exam results as well as advising can be considered a sufficient mechanism to motivate students to actively participate in the education process.

The PKA Assessment Panel states that the time allocated to checking and assessing the learning outcomes enables the proper verification of all learning outcomes. Impartiality, reliability and transparency of the process of checking and assessing the learning outcomes as well as credibility and comparability of assessment results do not raise any objections. The same applies to the

conditions of equal treatment of students in the process of checking and assessing the learning outcomes and the adaptation of the learning outcomes to the needs of students with disabilities.

Proposal for the rating describing the degree of satisfying criterion 2. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled

Justification

Both the computer science study programme and the possibilities of achieving the assumed learning outcomes should be assessed positively. The implementation of the study programme is well planned. The total number of hours at the full- and part-time first- and second-cycle studies, the total student workload measured by the number of ECTS points, as well as the student workload allocated to individual courses enable the achievement of the learning outcomes, assumed both for individual courses and the whole study programme. The formulation of modules, as well as their sequence in the study programme is correct and allows students to achieve the learning outcomes. The proportions between classes and lectures are correct and adapted to the specificity of the learning outcomes and the programme content. Both first- and second-cycle study programmes include classes related to the scientific activity conducted at the WSCS in information and communication technology. The student placements at computer science studies at the WSCS, including the internship programme, record keeping,placement selection, competences, experience and qualifications of internship supervisors, as well as the technical infrastructure at internship locations allow students to achieve the assumed learning outcomes.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 3. Admission to studies, verification of learning outcomes achievement by students, giving credit for individual semesters and years and awarding diplomas

Analysis of actual facts and the assessment of the degree of satisfying Criterion 3.

The rules of admission for the next academic year are set out in the Resolutions of the WSCS Senate. Admissions to the first-cycle studies are possible through recruitment, transfer from another university, or confirmation of the learning outcomes.

1. Admission to the School through recruitment is made by enrolling the candidate after submitting all the required documents on a first come first served basis.
2. The rules for recognizing the learning outcomes, education levels and qualifications obtained in higher education are set out in the applicable WSCS Study Regulations. A student may transfer to the WSCS from another university, including a foreign university,with the Rector's consent, expressed in the form of a decision issued after the student has fulfilled all

obligations arising from the provisions in force at the university from which he moves. The WWSI Vice-Rector for Student Affairs determines the conditions, date and manner of completing by the student the curricular differences between the study programmes.

3. The organization and rules for confirming the learning outcomes obtained outside the study system are set out in the WSCS Study Regulations. The detailed procedure of learning outcomes verification is regulated by a separate resolution of the Senate. The Rector specifies the individual curriculum plan for a student who has been admitted on the basis of learning outcomes verification. The Rector's decision granting the individual curriculum plan includes: the list of subjects from the study programme which he considers to be credited as a result of the learning outcomes verification, together with the appropriate number of ECTS points, a detailed individual study programme, the semester and year of studies, the name of the sudent's supervisor, and the individual curriculum plan.

The admission to the second-cycle studies is free for computer science first-cycle graduates. However, first-cycle computer science graduates with a bachelor's degree are required to pass additional subjects determined by the Rector.

The admission procedure applies to graduates of first-cycle studies other than computer science. The admission procedure for candidates for the second-cycle studies is conducted by the Admissions Committee appointed by the Rector and observes the following principles:

- candidates with a bachelor's degree in fields other than computer science are admitted according to their result of the qualification test based on the minimum curriculum of the computer science first-cycle study programme with a bachelor's degree,
- candidates who are Bachelors of Engineering in fields other than computer science are admitted according to their result of the qualification test based on the minimum curriculum of the computer science first-cycle study programme with a bachelor's degree in engineering,
- the qualification test may take the form of an interview or a test,
- the results of the qualification test are verified by at least two members of the Admissions Committee,
- based on the results of the test, the Admissions Committee prepares the lists of people qualified for admission. Additional subjects may be assigned to pass during the admission procedure.

During the meeting with the PKA Assessment Panel, students expressed their approval for the admission procedure applied by the School. They consider it to be transparent, taking into account the principles of justice and equal opportunities. The main source of candidates' knowledge regarding the current intake are open meetings conducted by the School in secondary schools, as well as the School website.

In the opinion of the PKA Assessment Panel, the conditions, criteria and procedures of admission are transparent, impartial and provide candidates with equal opportunities to undertake studies in the evaluated study programme.

The PKA Assessment Panel have no objections to the regulations developed at the School regarding the conditions and procedures for confirming the learning outcomes obtained outside the study system. The adopted conditions and procedures provide the opportunity to identify these

outcomes and assess their adequacy to the extent corresponding to the learning outcomes specified in the evaluated study programme.

The formal and substantive aspects of diploma awarding are described in § 31 of the WSCS Study Regulations. The topic of the thesis is determined by students together with their thesis supervisors whom they choose from a group of employees indicated by the School. The students present at the meeting with the PKA Assessment Panel expressed a positive opinion on the diploma awarding process.

All diploma theses are subject to verification in the Uniform Anti-plagiarism System. In the view of the PKA Assessment Panel, the adopted diploma awarding principles are correctly linked to the learning outcomes assumed for the evaluated study programme, accurate, unique and ensure the proper verification of the learning outcomes achieved by the students at the end of their studies.

During the first classes of their subjects academic teachers provide students with the module curriculum and recommended literature as well as define the form and conditions for verifying the learning outcomes. Detailed rules for passing individual subjects and ways to verify the achievement of the learning outcomes assigned to them are described in syllabuses which are made public. For each learning outcome of a given subject, the syllabus specifies its relation to the relevant learning objective, as well as the method of the learning outcome verification.

For two subjects (Algorithms And Data Structures and Numerical Methods), programming competitions were organized to verify the learning outcomes. In these cases, checking and assessing the learning outcomes achieved by the students is done by means of the system in which the competition takes place. A separate problem here is the verification of task independence. It has been solved by designing a computer programme that finds the similarities between the solutions sent by students for evaluation.

The verification forms of the learning outcomes achieved in English proficiency include an essay, tests and a presentation. They enable to check and assess the student language skills at B2 level at the first-cycle studies and B2 + at the second-cycle studies.

The learning outcomes achieved during student placement are verified by the internship supervisor who assesses the internship report.

The adopted principles of verifying and assessing the students' achievement of the assumed learning outcomes make it possible to monitor their progress, reliably and credibly assess the degree of the learning outcomes achievement and ensure the impartiality and transparency of this process, which was confirmed by the students of the computer science study programme during their meeting with the PKA Assessment Panel.

The applied methods enable the effective verification and assessment of all the learning outcomes. In order to check the level of engineering competences, laboratory classes and assessment methods used there are particularly useful. They include activity and performance assessment as well as lab report evaluation.

During the meeting with the PKA Assessment Panel, computer science students expressed positive opinions on the methods of checking and assessing the learning outcomes assumed for their study programme. Teachers consult test dates with students so that the students have enough time to prepare. The students receive information about the results of their tests and exams. If necessary, during office hours they have the opportunity to analyse their work and discuss their results with the teacher. Thus, the verification and assessment methods used are student-oriented, allow feedback

on the degree of the learning outcomes achievement, and motivate students to participate actively in the learning process.

The learning outcomes achieved by students are documented in the form of tests and exams, as well as project documentation, laboratory reports, internship reports and diploma theses.

The members of the PKA Assessment Panel familiarized themselves with selected mid-term and examination papers. They took various forms including : exercises, single and multiple choice tests, open questions which required descriptive answers, problem-solving questions and project documentation. Exam and project topics were at the right level of difficulty. The verification of the learning outcomes was carried out in accordance with the module syllabuses. All students' works were thoroughly checked. The form, content and difficulty of examination and mid-term papers are adapted to the level of general academic profile studies in information and communication technology.

The PKA Assessment Panel members also got acquainted with several diploma theses. The analysed works met the requirements specified for engineering and master's theses. The subjects of diploma theses carried out at second-cycle studies are related to the research currently conducted at the School, which allows students to acquire research competences. Diploma theses finally confirm that the students have achieved the assumed learning outcomes.

A dozen or so papers were published in 2015-2019 with the participation of computer science graduates - ten examples are listed below:

1. *Applications of firewalls in modern computer networks.* WSCS Research Papers 13 (2019), No. 20, pp 7-28.
2. *Dynamics of stochastic vs greedy heuristics in travelling salesman problem.* WSCS Research Papers 12 (2018), No. 19, pp 7-24.
3. *Comparison of native functions execution times in mobile applications implemented in native and hybrid technologies.* WSCS Research Papers 112 (2018), No. 19, 5. 51-77.
4. *Applications of switches in modern ICT infrastructure.* WSCS Research Papers 12 (2018), No. 19, pp 79-109.
5. *On the clustering of correlated random variables.* WSCS Research Papers 12 (2018), No. 18, pp 45-114.
6. *Application of scrum methodology in implementation of example Internet banking system.* WSCS Research Papers 12 (2018), No. 18, pp 7-44.
7. *Analysis of selected information analytics tools for inspection of attacked information systems.* WSCS Research Papers 11 (2017), No. 17, pp 69-87.
8. *Analysis of selected tools for IT systems' scanning.* WSCS Research Papers 11 (2017), No. 17, pp 89-109.
9. *Study of advantages and limitations of network traffic control with the help of MPLS protocol in modern networks.* WSCS Research Papers 10 (2016), No. 15, pp 19-39
10. Selected mechanisms to guarantee quality of service in IP networks. WSCS Research Papers 10 (2016), No. 15, pp 49-64.

It is worth emphasizing that in the case of paper No. 2, students are independent authors of the article. It was written on the basis of their research on various heuristics used to solve the travelling

salesman problem. Three of these students participated in the Travelling Santa 2018 competition on the Kaagle platform. They took the 35th place out of 1874 teams and won a silver medal. The results of the competition can be found at https://www.kaggle.com/c/traveling-santa-2018-prime-paths/leaderboard/ in the Public Leaderboard tab.

The diploma theses and publications mentioned above prove that the students achieve the learning outcomes in the discipline to which the assessed faculty is assigned.

The students' learning outcomes are monitored by analysing the position of the School graduates on the labor market or their further education choices.

Proposal for the rating describing the degree of satisfying criterion 3. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled

Justification

The admission procedures for the computer science studies are defined correctly. The rules for recognizing the learning outcomes, education levels and qualifications obtained in higher education, as well as the rules for confirming the learning outcomes obtained outside the study system are also correctly identified.

Diploma awarding procedures including the process of selecting and approving the subjects of diploma theses, appointing reviewers and organizing diploma exams are defined properly. They are also correctly linked to the learning outcomes assumed for the assessed study programme.

The rules for passing individual courses and the ways of verifying the achievement of the learning outcomes assigned to each module are clearly defined. They are described in subject syllabuses and presented to students during the first class of a given course.

The process of verification and assessment of the learning outcomes achieved by students, and in particular test and exam management, do not raise any objections of the PKA Assessment Panel and is positively evaluated by students.

The analyzed mid-term and examination papers were at the right level of difficulty and were carefully checked. The analyzed diploma theses also met all the requirements set for engineering and master's theses.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 4. Competence, experience, qualifications and the number of staff providing education. Staff development and in-service training

Analysis of actual facts and the assessment of the degree of satisfying Criterion 4.

The School indicated 61 academic teachers, including 12 independent academic teachers and 18 PhD teachers, as its teaching staff in the computer science first- and second-cycle programme with a general academic profile. Classes at the first-cycle studies are conducted by 14 academic teachers for whom the School is the place of primary employment, 3 teachers employed part-time at the School and 13 teachers with employment contracts for specified tasks. Classes at the second-cycle studies are conducted by 14 academic teachers for whom the School is the place of primary employment, 3 teachers for whom the School is the place of secondary employment and 8 teachers with employment contracts for specified tasks. The staff structure and number enable to carry out the study programme successfully. Academic teachers who hold classes at the School have scientific achievements in information and communication technology or professional experience in the field of computer science, which allow them to fully realize the study programme, implement the assumed learning outcomes and provide students with engineering competences and full learning outcomes achievement at the first- and second-cycle studies. The scientific activity and qualifications of the academic staff ensure that students acquire engineering competences. The correct implementation of classes is possible due to academic teachers' didactic skills. The workload of individual teachers is also correct. The only problem is a large number of diploma theses supervised simultaneously by an academic teacher. It reaches over a dozen papers, and in an extreme case it amounts to 31 diploma theses.

Academic teachers who conduct classes using distance learning methods and techniques are well prepared for this form of teaching. Training in this field is regularly provided by universities.

The staffing analysis led to the positive assessment of the compatibility of qualifications, scientific achievement and professional experience of academic teachers giving classes in particular subjects with the course programmes and related learning outcomes. The selection of academic teachers ensures the correct implementation of classes.

Classes are regularly inspected by other academic teachers. During their site visit, the members of the PKA Assessment Panel inspected selected classes from the computer science study programme. These inspections showed that the academic teachers giving the assessed classes were well prepared for them, and the substantive and methodological level of these classes was high. The conducted inspections justify the positive assessment of the academic staff's didactic skills.

Students of the evaluated study programme also have the opportunity to evaluate their academic teachers, either in electronic form or on the Moodle platform. The evaluation questionnaire consists of questions regarding the teacher's punctuality, kindness, preparation and fairness in assessment. Closed questions involve choosing the right answer to a question among *Very good, Good, Adequate, Insufficient / unsatisfactory.* The questionnaire ends with an open question in which the student can include his written evaluation or discuss any other business. The School shares the conclusions drawn from the evaluation questionnaires with all students via e-mail. During the meeting with the PKA Assessment Panel the students of the evaluated degree programme expressed their positive opinion on the evaluation process, as well as the opportunity to learn about its results. Comprehensive staff evaluations are carried out regularly. They include teaching, organisational and scientific research activities. Didactic achievements also include educational support activities (e.g.

textbooks, scripts, reviews, introduction of a new subject, student research groups). The results of the staff assessment, including the conclusions from the evaluation questionnaires filled in by the students, are used for staff improvement and personnel policy.

The School ensures continuous improvement of the teachers' scientific and pedagogical qualifications, which leads to the stability of the highly qualified teaching staff. The staff development involves professional certificates confirming the level and validity of the specialist knowledge (e.g. CISCO, DBMS and company certificates from potential employers). Seminars and on-site training are important in educating staff and improving their quality.

The School employees also participate in external training and conferences. It is worth mentioning numerous undertakings in which the staff participate, aimed at organizing joint actions for education, science and culture in Poland, such as the Conference of Rectors of Academic Schools in Poland (CRASP), the Conference of Rectors of Vocational Schools in Poland (CRVSP) and the Polish Rectors Foundation (PRF). They spread knowledge on the quality of European education systems (including education quality assurance systems, the Framework for Qualifications of the European Higher Education Area - the Polish Model, and training for organizers and service staff of research projects).

Proposal for the rating describing the degree of satisfying criterion 4. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled

Justification

The competences, experience, qualifications and number of academic teachers ensure the proper implementation of classes. The School staff have scientific achievements in information and communication technology or professional experience in the field of computer science, which guarantee the correct realisation of the study programme and achieving by students the assumed learning outcomes.

The personnel policy ensures the selection of academic teachers based on transparent principles and enables the correct implementation of classes. It involves systematic assessment of the teaching staff, carried out with the participation of students. The staff assessment results are later used for further training , and stimulate the staff to continuous development.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 5. Education infrastructure and resources used in the implementation of the study programme and their improvement

Analysis of actual facts and the assessment of the degree of satisfying Criterion 5.

The Warsaw School of Computer Science has a modern and comprehensive teaching and scientific base for conducting classes and scientific activities in the evaluated study programme. The School has its own premises, with the area of approximately 3000 square metres. The number, size and layout of the rooms are adapted to the number of students and group sizes. The infrastructure ensures the full implementation of the education concept and learning objectives assumed for the computer science degree programme.

The teaching rooms have been equipped with modern audiovisual infrastructure (sound system, Internet access, audiovisual projectors, screens) and functional, ergonomic furniture. The rooms, specialist workshops, and laboratories, as well as their equipment are in line with the needs of the teaching and learning process. For sports and recreational activities the School uses external facilities.

The Warsaw School of Computer Science has 11 computer labs with 25 workstations in each lab. The technical equipment, as well as the number of computer workstations and licenses for specialized software, guarantee the correct implementation of classes, including students' independent research. Computer configuration is prepared jointly with the teachers of individual subjects and ensures the proper implementation of all module learning objectives. Each computer workstation is connected to an internal network and provides access to Internet resources and services.

The computer hardware infrastructure comprises 25 servers and about 340 terminals which use LAN, ensure stable and correct operation of computer laboratories, enable the administrative staff to perform their tasks and help to store and manage teaching resources. The IT infrastructure, technical facilities, teaching aids, research equipment and specialized software are efficient and modern. In addition, both teachers and students can use virtual computers configured and shared in the Cloudlabs service.

During the meeting with the PKA Assessment Panel students positively assessed the infrastructure of the School. In their opinion it allows achieving the assumed learning outcomes. They also positively assessed the size of the teaching rooms and their equipment, including the number of computer workstations which ensures them comfortable work. Students can freely use the wireless access to the Internet which has been provided on the School premises. The school facilities (laboratories, classrooms, lecture rooms) are available to students without restrictions after prior notification of the demand.

In order to support the didactic process and enable their students to learn effectively, the teachers not only recommend suitable literature but also provide the students with their own didactic materials in digital form. Additional teaching materials are also made available on various e-platforms. The forms of didactic resources enable both on-site and remote access to them and ensure effective classroom conduct. Currently, most modules and classes are conducted with the support of the Moodle learning platform. There is a library in the School building. Its location, size, layout and the number of library rooms, technical equipment, the number of places in the reading room and opening hours provide the conditions for comfortable use of the library resources in both traditional and digital form. The library collection includes 12,970 volumes. The library collects mainly textbooks, scientific papers and magazines useful for IT professionals in the education

process. The library contains items recommended in the module syllabuses in the number of copies adapted to the needs of the teaching and learning process and the number of students. The access to the Virtual Science Library is also provided via wired or Wi-Fi networks, which allows the use of scientific journals, including *Elsevier, Springer, Wiley, Nature,* and *Scopus* or *Web of Science* databases. Additionally, the School subscribes to 17 scientific magazines. The library catalogue, as well as the students' theses catalogue are available on the School website. The School employees are entitled to inter-library loans. The library systematically purchases Polish publications which are original works of Polish specialists, as well as translations of mainly English-language publications. The librarians consult all resources reviews and purchase plans with the representatives of the Library Council, teachers and students.

During the meeting with the PKA Assessment Panel, students informed its members that the Library gives them access to all the literature required by teachers. Students can tell the librarians which book items should in their opinion be included in the library resources. The main source of information on the library opening times, items availability, and the latest news is the library website, which is also available in English.

The architecture of the building is adapted to the needs of people with disabilities. Students with mobility disabilities are provided with a ramp for wheelchairs, a lift and a toilet adapted to their needs. The facilities for disabled students are currently being improved. The School is currently implementing two projects financed from EU funds as part of the *Digital University*, which will significantly improve IT infrastructure and resources. Another project planned for 2020 - *Digital University - University Without Barriers* will further adapt the School infrastructure to the needs of people with disabilities. The project involves the modernization of the existing architecture: induction loops for people with hearing disabilities, horizontal markings for the visually impaired , an audio-video system improving navigation around the university for people with hearing and vision disabilities, toilets adapted for people with disabilities, the purchase of IT tools supporting the education of people with various types of disabilities (such as a specially adopted platform to practise programming or applications for project simulations). The School systematically inspects its didactic and scientific infrastructure. The inspection of classroom facilities , teaching aids, research equipment, specialized software and library resources involves assessing their condition, accessibility, modernity and adaptation to the requirements of the teaching and learning process, number of students, and the needs of people with disabilities. Particular attention is paid to the technical requirements of equipment and installations, as well as to ensuring that the rules for using didactic, scientific and library infrastructure comply with the health and safety regulations. The academic teachers take active part in the inspections and can express their opinion in the report prepared after each inspection. Students can assess the School infrastructure by means of a questionnaire concerning the facilities available in teaching rooms, laboratories and the library. The survey is conducted once a semester on the Moodle platform. The study conducted in the 2018/2019 academic year indicates a high level of students' satisfaction both with the School infrastructure and the library service, which is reflected in the answers *Very Good* and *Good* and give an average result of 4.6 on a 5-point scale. During the meeting with the PKA Assessment Panel, students also expressed a positive opinion about the library service and the functionality of the available infrastructure.

Inspection reports and their conclusions help to improve the didactic, scientific and library infrastructure, classroom facilities , teaching aids, research equipment, specialized software and library resources.

Proposal for the rating describing the degree of satisfying criterion 5. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled

Justification

The didactic, scientific, library and IT infrastructure, classroom facilities , teaching aids, the library, information and educational resources, research equipment, as well as the infrastructure of other places where the classes take place, are modern, enable the proper implementation of classes and achieving by students the learning outcomes, including the preparation for conducting scientific activities or participating with them. They are also tailored to the needs of people with disabilities, and ensure that they are fully involved in the educational and scientific activities. The library contains items recommended in the module syllabuses in the number of copies adapted to the needs of the teaching and learning process and the number of students. The didactic, scientific, library and IT infrastructure, classroom facilities, teaching aids, the library, information and educational resources, as well as research equipment, are subject to systematic inspections in which students participate. The results of these inspections are later used in improvement actions. The School pays special attention to ensuring that the rules for using didactic, scientific and library infrastructure comply with the health and safety regulations.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 6. Cooperation with representatives of social and economic stakeholders on the development, implementation and improvement of the study programme and its impact on the development of the degree programme

Analysis of actual facts and the assessment of the degree of satisfying Criterion 6.

The cooperation between the WSCS computer science study programme and external entities is conducted in a formalized manner. It mainly includes contracts and agreements for the implementation of practical training of students, both technical classes using an external base (e.g. during study visits), as well as student placements. A strong point of the cooperation are regular, long-term and often direct (also informal) relations of the WSCS teaching staff with external stakeholders.

The WSCS educates future potential employees of IT departments in various companies and public institutions, not only for the regional labour market. Through constant cooperation with the local economic environment, it is also able to adapt its educational offer to the needs of this market.

The School contacts with the socio-economic environment significantly affect the formulation, implementation and improvement of its education concept. They allow to recognize the expectations and possibilities of future students, monitor and evaluate the teaching and learning outcomes

throughout the studies (e.g. by means of student placements). The contacts with graduates and employers help to adapt the study programmes to the needs of the labour market. A special position of the Public Relations Manager was opened at the WSCS to coordinate the cooperation with the socio-economic environment. The PR Manager's main tasks are to encourage, develop and monitor the cooperation with the socio-economic environment. In addition, the WSCS Council -the Team of Labour Market Experts - was established as an consultative advisory group for the WSCS Rector. The current forms of cooperation in the field of education comprise giving opinions on the study programme and learning outcomes, submitting suggestions concerning the education content, arranging student placements and study visits (e.g. study visits at Beyond.pl Data Cener in Poznan or Hewlett Packard Enterprise Poland in Warsaw), conducting additional classes for students by business employees, and jointly organising conferences in which students or academic teachers participate.

The cooperation with the socio-economic environment covers three main areas: activities providing IT support for school administration and computer labs supervisors in secondary schools, activities for students (particularly connected with arranging student placements) and a wide range of initiatives to support IT education aimed at WSCS graduates, the elderly and other interested parties, such as people with disabilities or those at risk of digital exclusion, as well as people interested in improving their digital competences by open training organised by the WSCS.

The WSCS authorities pay special attention to the cooperation with secondary schools with which the School has signed 143 cooperation agreements. It is reflected in the design and implementation of the education concept in the first-cycle studies. The content of some modules corresponds to the current core curricula for secondary schools and are related to the School study programmes. In this way the School eliminates the lack of technical support in the field of information and communication technologies which occurred during the wide-scale actions to equip schools with computer labs (within various projects implemented by the Ministry of National Education, such as *Computer Labs for Schools* or *Digital School*). It is worth emphasizing that in the implementation of projects addressed to secondary schools the WSCS closely cooperates with the leading computer science faculties in Poland: the Faculty of Mathematics, Computer Science and Mechanics of the University of Warsaw, the Faculty of Mathematics and Computer Science of the University of Wroclaw, the Faculty of Mathematics and Computer Science of the Jagiellonian University in Krakow, the Faculty of Computer Science of Poznan University of Technology, the Faculty of Automatic Control, Electronics and Computer Science of the Silesian University of Technology in Gliwice, the Faculty of Computer Science of Białystok University of Technology, the Faculty of Mathematics and Computer Science of Nicolaus Copernicus University in Torun, and the Faculty of Mathematics and Computer Science of Adam Mickiewicz University in Poznan.

The cooperation between the WSCS and secondary schools , including vocational schools, has been regular for a long time and resulted in such projects as *IT Education For Students* (in which about 40,000 students from schools in Warsaw and Mazovian Voivodship took part in free IT courses) or *IT School - a Nationwide E-learning Platform For Students* (which contained about 150 certified IT courses and thematic competitions for students). At present the IT School E-learning Platform is owned by NASK (Research and Academic Computer Network) and constitutes the basic educational resource of the National Education Network Programme. Until November 2018, 133,677 students from around 700 schools from all over Poland were registered in the programme. Since its launch, it

has had 1,652,338 accesses which proves its great popularity. The programme is an outstanding technical and organizational achievement of WSCS. In the years 2013-2019, nearly 14,000 people took part in various types of training (as part of universities' third mission). All these activities indirectly influenced the shape and implementation of the education concept in the WSCS. The School teaching staff have acquired extensive know-how and developed a code of good practice in implementing various forms of informal education over nearly twenty years of the School activity. Currently, the WSCS is implementing a project co-financed from the EU funds allocated to the Operational Programme Knowledge Education Development (PO WER) entitled *WSCS – A Socially Responsible University* (2018-2021). It includes, among other things, courses in graphic design and programming for 496 high school students, as well as courses that will allow 160 people to obtain IT certifications. The School efforts to ensure high quality of education was awarded both at home and abroad. In 2012, the supra-regional project *IT +* was awarded by the Ministry of National Education as part of the *Report on Good Practice in Education.* In 2013, lnformatics Europe (the association of computer science departments and research laboratories at European universities) gave the Warsaw School of Computer Science the prestigious *Best Practices in Education 2013* award. The *IT School* programme was granted the *EUNIS Dørup E-learning Award 2015* (EUNIS-European University Information Systems).

Another area of cooperation with the socio-economic environment are student placements organised by the Career and Internship Office in labour market institutions. This Office carries out various activities to build relations between the School and the labour market, arranges student placements, runs an employment agency and prepares students to enter the labour market. A very important area of cooperation with the socio-economic environment is the contact with School graduates, e. g. via the Linkedln social platform, which is currently used by over 3,000 WSCS graduates.

The WSCS documentation analysis and consultations with the representatives of the socio-economic environment prove that the cooperation with labour market institutions is carried out systematically and takes various forms (e.g. internships, volunteering, study visits, the participation of the representatives of the socio-economic environment in conducting classes, learning outcomes verification, certification or labour market analysis), adequate to the learning objectives, the needs arising from the implementation of the study programme and the achievement of the learning outcomes.

A measurable effect of the School cooperation with the socio-economic environment is scholarly and scientific interaction between IBM and the WSCS, such as jointly implemented educational programmes or IBM mentoring and consulting the diploma theses. IBM provided business and technical consultations concerning the use of analytical tools in the following projects: *Mobile Object Detection Systems Based On Video Signals, Heuristics In Optimization Problems And Data Analysis*, and *Design And Implementation of an Analytical Module For a Service And Trade Company*.

Thanks to the cooperation with IBM, WSCS students have also received a number of internationally recognized professional certificates including: Data Management certifications (DB2), Mobile Application Developer Explorer Badge (first level certificate - 109 students), Mobile Application Developer Mastery Badge (second level certificate - 78 students). Additionally, the WSCS teacher conducting these classes obtained the IBM certificate Instruction Badge for Mobile Application Developer. WSCS students participated also in such specialized IBM training as: *Mobile Programming, Cyber Security, Business Analytics* and *Data Management.*

The WSCS conducts periodic reviews of cooperation with the socio-economic environment, including employers. It assesses the proper choice of the cooperating institutions, the effectiveness of the cooperation and its impact on the contents and implementation of the study programme. These reviews are analysed and used to further develop the cooperation and consequently improve the study programme.

The business environment supports the School in running technical modules, through the direct participation of its representatives in classes, cooperation in choosing and implementing the topics of engineering works, help in arranging placements (both for WSCS students and teaching and research employees), as well as co-organizing training and courses (e.g. regarding SEP qualifications).

Thanks to all the activities undertaken by the WSCS , the quality of education in its computer science study programme is highly valued not only by employers who are willing to employ WSCS graduates, but also by students and graduates who by virtue of acquired skills receive employment in regional companies or start their own business activity in information technology or related fields.

Proposal for the rating describing the degree of satisfying criterion 6. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled.

Justification

The WSCS cooperation with the socio-economic environment, including employers, is regular and takes various forms, (e.g. the organization of internships and study visits, help in the implementation of diploma theses, the participation of socio-economic environment representatives in conducting classes or learning outcomes verification).

It should be emphasized that the WSCS cooperates in designing and implementing the study programme with the socio-economic environment institutions whose type and scope of activity are consistent with the education concept and learning objectives, as well as the related field and the local and regional labour market .

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

The School in collaboration with IBM has developed part of a virtual internship model. Elements of the so-called *education cloud* application were developed using the experience of working with students in the WSCS laboratory. With the use of advanced Cloud Computing techniques, an innovative, first in Poland system to automatically manage virtual internships was prepared.

The TPS (Tech Provisioning System - the original working name of the system) developed in the WSCS has become the nucleus of IBM Skills Academy - a cloud-enabled environment which allows academic teachers to remotely configure and create educational content, automatically collect project results in electronic repository and make initial assessment of student project work (Peer-Assessment Module).

Recommendations;

None

Criterion 7. Conditions for and methods of improving the internationalisation of education provided as part of the degree programme

Analysis of actual facts and the assessment of the degree of satisfying Criterion 7.

The main goals adopted in the School Internationalization Strategy for 2014-2020 include opening study programmes in English, increasing the number of foreign students at the WSCS, promoting the School on foreign markets, increasing the number of foreign teachers participating in the education process, increasing the mobility of the academic and administrative staff, the School participation in international bilateral and multilateral education projects, and particularly in developing joint education programmes, as well as improving foreign language competences of the School teaching and research staff. Since 2008, the School has actively participated in the student and academic staff exchange within the *Erasmus +* EU programme. Students can do part of their studies in Great Britain, Denmark, India or other countries. The WSCS Rector's Proxy for Internationalization at the Institute level is responsible for student mobility The office has its own website with information on mobility programmes and conferences. Moreover, students are kept informed via email. During the meeting with The PKA Assessment Panel students expressed a positive opinion on the internationalization activities.

In the years 2017-2019, IT Project Management first-cycle study programme in English was implemented as part of the EU co-financed project. 42 students from 14 countries took part in it. In the current academic year the School offers two first-cycle study programmes in English: IT Project Management and Cloud Computing. In the academic years 2017/2018 and 2018/2019 all willing students had the opportunity to take part in English-speaking research groups run by visiting professors. Foreign students had the opportunity to improve their language competences by participating in the obligatory Polish language course. The improvement of language competences among Polish-speaking students is mainly achieved through English language classes. The foreign language level in the assessed study programme is established by means of a placement test which directs the student to classes at a particular level. During the meeting with the PKA Assessment Panel students expressed a positive opinion on the current language placement system. Within their curriculum students have the opportunity to learn specialized language characteristic of their chosen specialization. Students of the evaluated study programme expressed a positive opinion about their language classes, indicating that all their suggestions were respected by the lecturers. In addition to language classes, the School offers students the opportunity to participate in some subjects taught in a foreign language. The decision on this matter is made by students together with the teacher at the beginning of the course. During the meeting with the PKA Assessment Panel, students reported that they take advantage of this offer.

As part of the *Erasmus +* programme , the School has signed bilateral agreements with ten partner universities from seven countries. By 20 Sept 2019, the scale of student and staff exchange had been as follows: five students had gone to study, three students had gone to placements, two academics had gone to teach and 24 employees had gone to training. The School employees also take part in foreign conferences. In the years 2014-2019, the School employees appeared at 25 international conferences. In the period 2013-2019,several visiting professors came to the School

including: Prof. Edith Elkind – the University of Oxford, and Tomasz Michalak, PhD – the University of Oxford. The above-mentioned international activity has resulted in the improvement of the quality of education in the evaluated study programme. The exchange of experience during educational missions or international conferences is a valuable source of new ideas and an opportunity to improve the adopted solutions. The experience gained by the WSCS staff in this way is used in modernizing the education process.

Since 2018, the School has participated in official educational missions organized by the Polish National Agency for Academic Exchange. During such missions (two missions in India and one mission in Vietnam), the School took part in the official education fair at the national stand, thus contributing to the accomplishment of the goal adopted in the internationalization strategy of the Ministry of Science and Higher Education. In the years 2014-2019, the School also participated in educational fairs in other countries including Turkey and Ukraine. In the coming academic year, there are plans to promote the School on foreign markets (seven countries) as part of the Perspektywy Education Foundation project entitled *Poland - IT Hub for You.* The School will also continue its participation in NAWA education missions. In addition, the provisions of the Internationalization Strategy connected with raising language competence among university staff are implemented through English language courses in which the didactic and administrative staff of the School can take part. By 20 Sept 2019 twenty WSCS employees had participated in them. Activities targeted at foreign School graduates will also be intensified thanks to the support received under the NAWA-funded *International Alumni* project.

The goal of all the described forms of international cooperation is to improve the quality of education in the evaluated study programme. The exchange of experience during educational missions or international conferences is a valuable source of new ideas and an opportunity to improve the adopted solutions. The experience gained by the WSCS staff is used in modernizing the education process.

Monitoring and evaluation of the educational process internationalization are carried out systematically as part of the School internal Education Quality Assurance System. The education cycles are subject to quality assessment through surveys which include assessing individual teachers, school facilities and the work of the Office for Student Affairs. The survey is addressed to students who participate in academic exchange and is filled out after every semester. From the surveys presented by the School it can be concluded that the students were satisfied with the international exchange and positively assessed the involvement of the School. To monitor and assess the degree of internationalization, class visits are conducted. The degree of internationalization is also assessed by visiting professors with many years of experience in the international environment. Reports on the degree of the WSCS internationalization are regularly prepared and the evaluation results are used to intensify internationalization and improve its quality.

Proposal for the rating describing the degree of satisfying criterion 7. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled.

Justification

The School has created favourable conditions for the internationalization of education in the assessed study programme , complying with the adopted education concept. Both the academic

teachers and the students are prepared to use English as the language of instruction. International mobility of students and academic teachers is supported, and an educational offer in foreign languages is being prepared.

The internationalization of education is subject to systematic assessments in which students actively participate. The results of these assessments are used in improvement activities and contribute to the systematic increase in the degree of internationalization, as well as student and staff exchange.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 8. Supporting learning, social, academic or professional development of students and their entry on the labour market. Development and improvement of such support

Analysis of actual facts and the assessment of the degree of satisfying Criterion 8.

Students are motivated to achieve the learning outcomes through the scholarship system employed by the School.

Students have the right to submit an application for a longer or shorter time off. The procedure to apply for a leave is governed by § 25 of the Study Regulations and the consent to a leave is given by the Vice-Rector.

The support of academic teachers is mainly manifested in their availability to students. During office hours students can discuss with them both substantive and formal issues. During the meeting with the PKA Assessment Panel students indicated that they value office hours and e-mails as they allow them to maintain constant contact with the teaching staff. They also stated that the office hours listed on the School website are current and tailored to their needs.

Students of the evaluated study programme have the opportunity to submit complaints and requests in oral and written form, as well as via a student government representative. During the meeting with the PKA Assessment Panel both students and the Student Government confirmed that they are familiar with the procedure for submitting complaints and requests to the School. In addition, they indicated that most cases are resolved in favour of the student.

The student support system includes information activities concerning security as well as discrimination and violence prevention. The Rector's Standing Committee on Prevention of Discrimination has recently been appointed. Students of the evaluated study programme have the opportunity to practise various forms of activity within student organizations which helps them to acquire strong organizational skills.

The Disability Support Team provides financial support and adopts the learning process to people with disabilities. The Team always consults the date and place of meetings with a person with a disability according to their needs. In the academic year 2019/2020, one physically impaired person and one person with impaired hearing study full-time in the evaluated study programme. The

School is implementing a financial support system for students with disabilities consisting of information activities about higher education subsidies they are entitled to as well as funds granted by the State Fund For Rehabilitation Of Disabled People (PFRON). During the meeting of the PKA Assessment Panel with the Student Government, the students confirmed that the support of students with disabilities in the evaluated study programme is adequate and the rental service of specialized equipment for students with disabilities is very popular. The Career and Internship Office provides counseling to the students of the evaluated study programme. It conducts numerous information campaigns about current jobs and internships, mainly via social media and the Office website. The Career and Internship Office has a base of about 800 companies, institutions and offices where students can undertake internships. In the academic year 2018/2019 as part of the *Core IT Program* the Office conducted a series of study visits at the headquarters of such companies as Intel Research and Development Center in Gdansk, Central Anticorruption Bureau, or Aviva Poland. Students confirmed that they are familiar with the offer of the Career and Internship Office. They can learn about it from e-mail messages, information boards and the Office website.

The Dean's Office is responsible for providing administrative assistance to students of the evaluated study programme. It is open every day except for Thursdays, at the hours convenient to both full-time and part-time students. During the meeting with the PKA Assessment Panel students expressed a positive opinion on the functioning of the administrative service, pointing to the kind and open attitude of the administrative staff, as well as their commitment to student affairs.

Students have the possibility of personal contact with the Rector and the President of the School. The meeting is arranged individually, according to the student's needs. During the meeting with the PKA Assessment Panel, students expressed a positive opinion on the activities of the School authorities. They particularly emphasized their availability, care of the computer science study programme and individual approach to each student.

Students of individual training groups in the evaluated study programme have selected prefects who represent them in contacts with the academic and administrative staff.

Students of the evaluated study programme are involved in the activities of the Algorithms Research Group, the Artificial Intelligence Research Group and the Data Science Research Group. During the site visit, the PKA Assessment Panel met with the representatives of these groups who expressed a positive opinion on the conditions that the School provides for their scientific research. The research groups raise funds for their activities after obtaining formal consent from the President of the WSCS. Students can count on the professional support from the mentors to their research groups as well as the financial support from the School authorities. All the above-mentioned research groups represent the WSCS at various conferences and science fairs where they present their achievements. The research groups also take part in various competitions, such as Poznan Open Team Programming Championship, Central European Regional Contest or Kaggle Intern0ational Optimization Competition. Students of the evaluated study programme are also involved in the publication of the WSCS Research Papers.

During the site visit of the PKA Assessment Panel, a meeting with representatives of the Student Government was held. Representatives of the Student Government are members of the collective bodies - the Senate, the Scholarship Committee and the Library Council. The WSCS Student Government obtains financial resources by submitting a budget estimate at the beginning of each academic year, which is then approved by the President. In addition, the School provides organizational facilities and an office for the ongoing activities of the Student Government. The

representatives of the Student Government present at the meeting with the PKA Assessment Panel confirmed the support that the WSCS offers for their activities.

The School evaluates the student support system which makes it familiar with the students' opinions on its functioning. The evaluation survey is carried out on the Moodle platform and includes the assessment of activities undertaken by the Career and Internship Office, administrative service, the School support for students, as well as the remote access to administrative and didactic resources, such as students' grades, applications, class schedules or teaching materials. The survey also contains questions concerning students' satisfaction with the choice of the university, the quality of facilities, as well as the organization of internships.

Positive answers to the above questions comprised on average over 50% of all answers. The student support system is also evaluated within the survey, as four out of 14 questions concern this issue. Some questions relate to students' satisfaction with the administrative and library service. During the meeting with the PKA Assessment Panel, the students confirmed their positive opinion on the student support offered in the evaluated study programme. They also pointed out that a more attractive form of submitting requests and comments are meetings in person with the President and the Rector of the WSCS.

Proposal for the rating describing the degree of satisfying criterion 8. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled.

Justification

The scholarship system meets the students' expectations and the School informs its students about the financial support they are entitled to. Students are motivated to achieve very good academic results by the possibility of obtaining the Rector's Scholarship for the Best Students. The Disability Support Team conducts a number of activities to adapt the support system to the needs of students with disabilities. In addition, it gathers detailed information about people in need of such support, including the type of disability, the year of study, and the student's class schedule. Consequently, it can provide personalized help. The Career and Internship Office provides professional counselling. Students positively assess the quality of administrative services provided by the Dean's Office. The School asks its students for their opinions regarding the the scholarship system, the administrative service, the internationalization process, the activities of the Career and Internship Office, as well as the support offered to people with disabilities. The School informs and educates students about security and anti-discrimination issues. The activities include thematic training and maintaining constant contact with the Student Government.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 9. Public access to information about the study programme, conditions for its implementation and achieved results

Analysis of actual facts and the assessment of the degree of satisfying Criterion 9.

The School provides public access to information about its educational offer for a wide audience. The distribution of content on the website and the navigation are clear and allow intuitive search for relevant information. An exception to this rule is the access to the Study Regulations and the description of the learning outcomes which are only available after logging into the electronic index. The WSCS website does not provide any information on the results of the education quality analyses carried out in the School or the composition of relevant committees. General reports are available to all students via e-mail.

The scope of information related to the educational process available on the School websites is wide and includes the admission process, the scholarship system, syllabuses and the details concerning current study programmes. The PKA Assessment Panel recommends the ongoing analysis of information published on the website in terms of its topicality.

The School websites are subject to systematic assessment for their compliance with the needs of various groups of recipients, primarily students. They are constantly monitored by the university authorities and regularly evaluated by students through surveys. The results of these surveys are later used to improve the availability and quality of information about the studies.

During the meeting with PKA Assessment Panel, the students of the evaluated study programme confirmed that public information is available and easy to obtain in the School. Students receive current information about the support system through the university websites, e-mail messages and information cabinets. A useful source of information is also the Dean's Office. People with disabilities can easily access information through computer stations located in the library. They are equipped with an enlarger, a scanner and a keyboard with an enlarged font. Students present at the meeting with the PKA Assessment Panel expressed a positive opinion on the availability of information during the admission process, indicating that the main sources of information about the School offer for them were classes organised by the School in secondary schools, as well as the university website. Students also expressed their approval for the design and functioning of information system on learning outcomes and assessment results. The main source of information is the Moodle platform , which serves as an electronic dean's office. The information on the assumed learning outcomes, as well as the organizational issues, are published there and regularly updated.

Public access to information includes the conditions and criteria for admission to the School. Students confirmed that the admission process was transparent to them due to the access to all necessary information.

Public access to information is evaluated by students in the evaluation survey, part of which is devoted to the assessment of the IT system used in the School. The questions relate to the quality and form of information about the studies and non-academic activities.

In the survey carried out in the 2018/2019 academic year, positive feedback accounted for over 60% of all students' responses. During the interview with the PKA Assessment Panel , students confirmed their opinion expressed in the online questionnaire and positively assessed the information on

education process provided by the School both from the perspective of candidates and current students.

Proposal for the rating describing the degree of satisfying criterion 9. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled.

Justification

The School provides public access to information about their educational its for a wide audience. The distribution of content on the websites is clear and the navigation is intuitive. Apart from the quick access to the learning outcomes and the Study Regulations, the websites allow intuitive search for relevant information.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

Criterion 10. Quality assurance policy, designing, approving, monitoring, reviewing and improving the study programme

Analysis of actual facts and the assessment of the degree of satisfying Criterion 10.

The substantive, organizational and administrative supervision over the computer science study programme is exercised by the Rector of the WSCS, through the Rector's Proxy for Education Quality. The Rector's Proxy for Education Quality is responsible for the overall concept, functioning and development of the School internal Education Quality Assurance System. He coordinates the activities of the Education Quality Assurance Panel in the School and exercises direct supervision over its work. The Panel consists of the Vice-Rector for General Affairs, heads of teaching and research units, heads of academic specializations, a representative of the Student Government, a representative of the graduates, a representative of the WSCS Council, the head of the Career and Internship Office, the head of the cooperation with the socio-economic environment and a representative of the founder. The activities of the Panel are defined in the School internal Education Quality Assurance System. It contains information on planning, developing, changing and approving the study programmes, as well as monitoring, documenting and improving the quality system in the School.

The Education Quality Assurance System defines the procedures for planning and implementing study programmes, with particular emphasis on the diploma process. The Education Quality Assurance System comprises the Quality System for Research and Scientific Development, the Employee Evaluation System, the Administration Quality System, the Internal Financial Control and Audit System, as well as the recommendations of the School collegial bodies.

Designing the study programme in the School is based on the general concept of education, which is part of the School strategy and mission, prepared by the Panel For Developing the Concept of Education appointed by the WSCS Rector. Some suggestions of changes in the curricula come also from the ongoing quality assessment concerning the implementation of the learning outcomes, which is part of monitoring and quality assurance procedures. The resolution of the WSCS Senate No. 4a/S/2017 of 2017 specified the procedure for updating the study programme. Issues concerning education quality assessment are discussed during WSCS Council meetings and scientific conferences with external stakeholders. In the opinion of the PKA Assessment Panel, the School has appointed a person supervising the evaluated study programme and correctly designed their competences. The School carries out admissions to studies in accordance with its regulations. The School conducts an ongoing analysis of the teaching process, taking into account the needs of the socio-economic environment.

The detailed rules regarding the admission conditions and procedure are set out in the Resolutions of the WSCS Senate. For the first-cycle study programme may apply a person who has a secondary school-leaving certificate or another document recognized in the Republic of Poland as a document entitling them to apply for admission to studies in accordance with art. 93 item 3 of the Act of 7 September 1991 on the Education System (Journal of Laws 2018, items 1457 and 1560) Admissions to first-cycle studies are carried out through recruitment, a transfer from another university or the confirmation of learning outcomes.

The implementation of the study programmes is monitored by the heads of the teaching and research units and the Rector's Proxy for Education Quality through module inspections, seminars, training and interviews. The monitoring of the study programme implementation is supported by a student survey system and periodic assessment of the work of academic teachers. Mid-term reviews of the study programmes take place during scientific seminars which are partially devoted to specifying the research conducted in the School and assessing its impact on the study programmes, and particularly the education process.

The School conducts systematic assessment of the learning outcomes. Strong emphasis is put on their compliance with the needs of the labour market.

In addition to the classic grading system, the degree of learning outcomes achievement among students is measured by annual rankings of the best students and rankings of all students after graduation but before taking the diploma exam.

An interesting way employed to assess the learning outcomes is tracing the professional activity of students on the labour market. After graduation, the assessment of the learning outcomes is based on studying the professional fate of the School graduates by the Career and Internships Office, a nationwide survey of the economic fate of graduates by the Polish Graduate Tracking System (ELA) commissioned by the Ministry of Science and Higher Education, and the analysis of data available on the Linkedin social platform. A special group for the School graduates has been set up on this platform, which enables ongoing tracking of the graduates' professional careers, promotions and changes in employment, as well as the assessment of their skills by their employers and colleagues. Currently, the School has access to the professional profiles of over 3000 graduates on the LinkedIn platform , which enables the WSCS to assess the level and quality of the learning outcomes for nearly 75% of its graduate population. The implementation and improvement of the study programmes are monitored by internal and external stakeholders.

The School conducts extensive surveys among secondary school teachers and students. The results and reports from these surveys are systematically used to improve training programmes. Right before the beginning of the current academic year the School started the webinar programme for its candidates. This type of contact with candidates allows them to become familiar with the study programmes and university expectations regarding the level of their knowledge. The webinar program served a group of over 300 people for whom 75 hour's meetings with the heads of the study programmes were organized.

Monitoring students' progress during the studies and after the graduation by external stakeholders includes the cooperation with employers through the Career and Internship Office and regular consultations with IT labour market experts represented in the Rector's College and with lecturers who are both academic teachers and IT practitioners.

Monitoring the implementation of the study programme by students is carried out through the student survey system called *Pollster*. Student surveys are carried out after each completed semester. Students also have the opportunity to formulate free statements and comments on various topics in the form of so-called *Hyde Park*. After each semester students also assess the School image and selected aspects of the School functioning. The School authorities hold meetings with the Student Government regularly twice a year. During these meetings the results of student survey analysis are discussed and decisions are made to implement the suggested solutions in the areas which need improving. The evaluated study programme is subject to monitoring, review and improvement by the Education Quality Assurance Panel, to which one student is appointed.

The cooperation with the socio-economic environment comprises the cooperation with labour market institutions in the form of student placements arranged by the Career and Internship Office. The PKA Assessment Panel positively assesses this form of cooperation with the socio-economic environment. The WSCS regularly reviews its cooperation with the socio-economic environment, including employers, in relation to the study programme and the proper selection of cooperating institutions, also those providing internships for students.

The PKA Assessment Panel was presented with a quantitative assessment of the students' results, including the results of diploma thesis exams. The presented materials are discussed by teaching teams and the conclusions are later used to improve the teaching process.

Internal and external stakeholders take part in the assessment of the study programmes. The conclusions from this assessment serve to improve the quality of education. The conclusions from the study programme evaluation are used to improve the programme. The improvements include:

- developing new teaching materials for new subjects including the latest service integration and management practices (SIAM, VeriSM),
- free access for WSCS students to tools supporting the automation of Service Desk and AgileScrum processes,
- launching new classes which include the SIAM integration services,
- introducing classes in English,
- launching new lab classes in the Embedded Systems laboratory,
- designing a new laboratory for the modules: Introduction to Electronics, Electrical Engineering and Electrical Measurement,
- developing new teaching materials for the subjects: Introduction to Programming and Programming Methods,

- preparing the subjects Data Mining and Advanced Object Oriented Design to be taught in English,
- modernising the subject Signal Transmission Technology,
- purchasing professional software for mobile networks emulation (for the specialization Mobile Systems Engineering),
- modifying the educational content of the subjects Individual Project and Team Project,
- modifying the educational content of the Mobile Systems lab classes,
- incorporating SOLID object-oriented programming practices into the subject Languages and Programming Paradigms,
- extending the programmes of subjects Linear Algebra and Analytical Geometry to include issues relevant for computer science students,
- introducing Skype and Teams video conferencing tools to the classes,
- introducing project work to the subject Advanced Database Systems.

The PKA Assessment Panel positively assesses the activities to improve the quality of education in the evaluated study programme. In the opinion of the Assessment Panel, the external analysis of the quality of education is performed correctly, and the conclusions from this analysis are used to improve the teaching process.

3.1 Proposal for the rating describing the degree of satisfying criterion 10. (criterion fulfilled/ criterion partially fulfilled/ criterion not fulfilled)

Criterion fulfilled.

Justification

The School exercises substantive, organizational and administrative supervision over the computer science study programme. The Rector's Proxy for Education Quality is responsible for the overall concept of the School's internal Education Quality Assurance System, its functioning and development.

The Education Quality Assurance System defines the procedures for planning and implementing study programmes, with particular emphasis on the diploma process. The Education Quality Assurance System comprises the Quality System for Research and Scientific Development, the Employee Evaluation System, the Administration Quality System, the Internal Financial Control and Audit System, as well as the recommendations of the School collegial bodies.

Designing the study programme in the School is based on the general concept of education and the ongoing assessment concerning the implementation of the learning outcomes. The resolution of the WSCS Senate No. 4a/S/2017 of 2017 specified the procedure for updating the study programme. The study programme approval procedure takes into account the conclusions from quality assessment, course inspections and periodic assessment of the work of academic teachers. The PKA Assessment Panel positively assesses the adopted procedures.

The detailed rules regarding the admission conditions and procedure are set out in the Resolutions of the WSCS Senate. The implementation of the study programmes is monitored by the heads of the teaching and research units and the Rector's Proxy for Education Quality through course inspections, seminars, training and interviews. The monitoring of the study programme implementation is supported by a student survey system and periodic assessment of the work of academic teachers.

The School conducts systematic assessment of the learning outcomes. Strong emphasis is put on their compliance with the needs of the labour market. The implementation and improvement of the study programmes are monitored by internal and external stakeholders. The evaluated study programme is subject to monitoring, review and improvement by the Education Quality Assurance Panel, to which one student is appointed. The School performs the quantitative assessment of the students' results, including the results of diploma thesis exams. Internal and external stakeholders take part in the assessment of the study programmes. The external analysis of the quality of education is performed correctly , and the conclusions from this analysis are used to improve the teaching process.

The PKA Assessment Panel positively assesses the activities taken by the School to improve the quality of education in the evaluated study programme.

Good practices, including those that may form the basis for awarding to higher education institution a Certificate of Educational Excellence

None

Recommendations;

None

4. Assessment of a higher education institution's acting on the recommendations presented in the justification of the PKA Presidium's resolution on programme assessment of the degree programme, which preceded the current assessment (in the order of individual recommendations)

There are no recommendations of a corrective nature in the justification of the the PKA Presidium's resolution on the programme evaluation in the computer science study programme at the WSCS that preceded the current evaluation. The recommendations presented below were formulated in the site visit report.

Recommendation

Attention should be paid to a thorough analysis of the requirements during the implementation of an engineering project. Theoretical and review works should be eliminated. An engineering or master's thesis must take the form of an engineering project which results in a working product (prototype, system, etc.).

The members of the PKA Assessment Team also got acquainted with several diploma theses. The analysed works met the requirements for engineering and master's theses.

5. Annexes:

Annex 1. Legal basis of the assessment of education quality;

1. The Act of 20 July 2018, The Law on Higher Education and Science (Journal of Laws 2018, item 1668, as amended);
2. The Act of 3 July 2018, provisions enacting the Law on Higher Education and Science (Journal of Laws 2018, item 1669, as amended);
3. The Act of 22 December 2015 on the Integrated Qualifications System (Journal of Laws 2016, item 64, as amended);
4. The Resolution of 12 September 2018 by the Minister of Science and Higher Education on the study programme evaluation criteria (Journal of Laws 2018, item 1787);
5. The Resolution of 27 September 2018 by the Minister of Science and Higher Education on the studies (Journal of Laws 2018, item 1861);
6. The Resolution of 14 November 2018 by the Minister of Science and Higher Education on the description of the second-cycle learning outcomes for levels 6-8 of the Polish Qualifications Framework (Journal of Laws 2018, item 2218);
7. The Statute of the Polish Assessment Committee adopted by the Resolution No. 4/2018 of 13 December 2018 by the Polish Assessment Committee on the Statute of the Polish Assessment Committee, as amended;
8. The Resolution No. 67/2019 of 28 February 2019 by the Polish Assessment Committee on the site visit regulations as part of the study programme assessment.

Annex 2. Detailed schedule of the site visit and the division of tasks between individual members of the assessment panel

Thursday, 24 October 2019

Arrival of the PKA Assessment Panel members to Warsaw

Friday, 25 October 2019

8:30
Departure from the hotel to the WSCS
9:00 - 9:30
Meeting with the School and evaluated study programme authorities
9:30 - 10:00
Meeting with the study programme authorities to discuss the details of the site visit.
Meeting with the team preparing the self-assessment report.
Arranging individual meetings of the Assessment Panel members with persons responsible for particular issues in the Unit (education, staff, etc.).

10:00 – 10:30

Meeting with Prof. Bogdan Galwas, the author of the concept of introducing modern technologies (such as virtualisation) to the WSCS education programme and the person responsible for its implementation, and Prof. Maciej Sysło, who deals with the School social responsibility and its activities for secondary school teachers and students

10:00 - 5:30

Inspections of selected classes

Getting acquainted with some theses and mid-term works

10:30 – 11:00

Meeting with people responsible for ensuring the quality of education

11.00-11.30

Meeting with the person responsible for the internationalization process

11: 30- 12:00

Meeting with the representative of the Career and Internship Office

12: 00- 1:00

Meeting of the Assessment Panel with computer science students

12.30 – 1.30

Meeting of the Assessment Panel with the staff of the evaluated study programme

1:30 - 2:00

Meeting with Ms Justyna Gołaszewska and Ms Weronika Jakubowska responsible for the concept and implementation of the School's applications for programmes financed from the EU and other external funds.

2: 00-3: 00

Meeting with the representatives of the socio-economic environment

2:00 - 2:30

Meeting with students active in research groups

2:30 - 3:00

Meeting with the Student Government

3: 00-4: 00

Lunch break

4: 00-5: 30

Getting acquainted with some theses and mid-term works

5.30

End of the first day of the site visit

Saturday, 26 October 2019

8:30 - Departure from the hotel to the WSCS

9: 00-11: 00

Visiting the library and university facilities

10:30 – 11:00
Meeting with the person in charge of caring for people with disabilities
11: 00-11: 30
Meeting with persons responsible for internships
11:30 - 12:30
PKA Assessment Panel working meeting on the assessment of the individual criteria and the recapitulation of the site visit
12: 30-1: 00
Final meeting of the PKA Assessment Panel with the School authorities

Tasks allocated to the members of the Assessment Panel:
Jan Ogonowski, BEng, PhD, DsC, ProfTit
Description of criterion 10;
Jarosław Stepaniuk, BEng, PhD, DsC, ProfTit
Description of criteria 1, 2, 3,
Jerzy Świątek, BEng, PhD, DsC, ProfTit
Description of criteria 4,5,7
Waldemar Grądzki, PhD
Description of criterion 6
Sara Zemczak,
Description of criteria 8.9,
Agnieszka Kozera, MSc
Compilation of the site visit report on the basis of individual reports.

Annex 3. Assessment of selected mid-term papers and of final theses

Part 1. Assessment of randomly selected mid-term papers

Course name / module, mode of class: lecture, tutorial, seminar, laboratory, language course, etc.)	**Basics of Physics**, lecture
Full name, degree/title of the academic teacher teaching the class	K. Drażba, MSc, full-time studies; K Drażba, MSc, part-time studies
Academic Year	2018/19
Degree programme / specialisation / mode of studies (full-time/part-time) / cycle of studies / year of study / semester	Computer science, full-time studies, 1st year; Computer science, part-time studies, 1st year
a. forms of mid-term papers	Written multiple choice exam involving calculation
b. conformity of the paper topic with the course/module syllabus	The paper topic conformable with the course syllabus

d. correctness of the selection of methods for verifying the outcomes	Methods for verifying the outcomes selected correctly
e. legitimacy of the assessment	Legitimate assessment. Point system. Scores in the part-time studies lower than in the full-time studies.

Course name / module, mode of class: lecture, tutorial, seminar, laboratory, language course, etc.)	**Elements of Artificial Intelligence**, lecture
Full name, degree/title of the academic teacher teaching the class	Ryszard Wieleba, BEng, PhD
Academic Year	2018/ 19
Degree programme / specialisation / mode of studies (full-time/part-time) / cycle of studies / year of study / semester	Computer science, first-cycle full-time studies, 2nd year, 6th semester
a. forms of mid-term papers	Written exam composed of four parts concerning i. a. genetic algorithms, neural networks, knowledge representation and the notion of artificial intelligence.
b. conformity of the paper topic with the course/module syllabus	The exam contents conformed with the lecture syllabus. The exams questions were relatively easy.
d. correctness of the selection of methods for verifying the outcomes	The correctness of the selection of methods for verifying the learning outcomes raises no objections. The exam questions are varied and thoroughly verify the students' knowledge.
e. legitimacy of the assessment	The objectivity of assessing students' exams raises no objections. The documentation of the verification of the learning outcomes stored on paper is complete and does not raise any objections.

Course name / module, mode of class: lecture, tutorial, seminar, laboratory, language course, etc.)	**Discrete Mathematics**, lecture
Full name, degree/title of the academic teacher teaching the class	Zenon Gniazdowski, BEng, PhD, DsC, WSCS Prof
Academic Year	2018/19
Degree programme / specialisation / mode of studies (full-time/part-time) / cycle of studies / year of study / semester	Computer science, first-cycle full-time studies, 2nd semester
a. forms of mid-term papers	Written exam in five parts. The questions relate to the properties of binary relations such as reflexivity, symmetry or transitivity and to combinatory analysis.

b. conformity of the paper topic with the course/module syllabus	The exam content conformed with the lecture syllabus
d. correctness of the selection of methods for verifying the outcomes	The correctness of the selection of methods for verifying the learning outcomes raises no objections. The exam questions are diverse and comprehensively verify the students' knowledge.
e. legitimacy of the assessment	The objectivity of assessing students' works raises no objections. The documentation of the verification of the learning outcomes stored on paper is complete and does not raise any objections.

Course name / module, mode of class: lecture, tutorial, seminar, laboratory, language course, etc.)	**Digital Communications Engineering**, lecture, classes
Full name, degree/title of the academic teacher teaching the class	Bogdan Galwas, BEng, PhD, DSc, ProfTit; Krzysztof Madziar, BEng, PhD
Academic Year	2018/19
Degree programme / specialisation / mode of studies (full-time/part-time) / cycle of studies / year of study / semester	Computer science first-cycle full-time and part time studies, 2nd year, 4th semester
a. forms of mid-term papers	Exam, mid-term test, project tasks
b. conformity of the paper topic with the course/module syllabus	Paper topics consistent with the course syllabus. The exam contained problem-solving questions and calculation tasks. Mid-term exam questions involved example calculations of signal properties. Project tasks included a practical task description, theoretical background and calculations for specific real data. Sample project topics: transmission line, transistor amplifier, optical link, radio link.
d. correctness of the selection of methods for verifying the outcomes	Students' works comprise task solutions which show step-by-step procedure, sample calculations, analysis results, and answers to problem-solving questions. . The verification methods cover the full range of the learning outcomes.
e. legitimacy of the assessment	In-depth assessment of the students' works. The works contain precise comments justifying the assessment. Objective evaluation of works. The percentage distribution of grades reflects the quality the students' works. The works

	in the full-time and the part-time studies are on the same level.

Course name / module, mode of class: lecture, tutorial, seminar, laboratory, language course, etc.)	**Operations Research**, lecture, laboratories
Full name, degree/title of the academic teacher teaching the class	Leszek Rudek, PhD; Łukasz Skibniewski, MsC
Academic Year	2018/19
Degree programme / specialisation / mode of studies (full-time/part-time) / cycle of studies / year of study / semester	Computer science first-cycle studies full-time and part time, 3rd year, 6th semester
a. forms of mid-term papers	Exam, lab report
b. conformity of the paper topic with the course/module syllabus	The contents of examination tasks consistent with the course syllabus. A wide spectrum of tasks, including: decision problem formulation, linear programming, network programming, decision tree. Laboratory tasks involved solving operations research problems with the use of available software tools.
d. correctness of the selection of methods for verifying the outcomes	Students' works comprise exercise solutions which show step-by-step procedure, sample calculations, analysis results, and answers to problem-solving questions. The verification methods cover the full range of the learning outcomes.
e. legitimacy of the assessment	In-depth assessment of the students' works. The works contain precise comments justifying the assessment. Objective evaluation of works. The percentage distribution of grades reflects the quality the students' works. The works in the full-time and the part-time studies are on the same level.

Part 2. Assessment of randomly selected final theses

Graduate's full name (student's book number)	Kacper Jerzy Sieradzki 7581
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle part-time studies

Degree programme / specialisation track	Computer Science / Database Systems Engineering
Thesis title	The Design of Effective Duel Support in the Game *World of Warcraft Battle Pets*
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Szymon Superniak, BEng PhD 4,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Piotr Kopciał, BEng PhD 5,0
Overall grade	3,78
Grade awarded for the final examination	very good
Grade at the diploma	good
Questions asked during the final examination	1. Explain the concept and describe the objectives of DDL and DML in databases. 2. Discuss selected models of software life-cycle. 3. What are numerical methods used for? Data types.
Type (nature of the work) and a brief description of the contents	There were 12 items in the bibliography. The aim of the work was to devise a system of character selection to make the game more effective. An analysis of the effective domain for the domain was carried out. A visual presentation of the game effectiveness data was made by means of a graphical interface in the form of a web page created in ASP.NET with the help of Microsoft Visual Studio programme.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier	YES

qualification (bachelor of science or master of science degree)	
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades awarded by the supervisor and the reviewer are legitimate.

Graduate's full name (student's book number)	Anna Kisielińska – Ptasznik 6922
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	Second-cycle part-time studies
Degree programme / specialisation track	Computer Science / Project Management
Thesis title	Application of Artificial Neural Networks in Preliminary Selection of Pigmented Lesions for Further Melanoma Diagnosis
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Ewa Figielska, BEng PhD 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Leszek Rudak, PhD 5,0
Overall grade	4,97
Grade awarded for the final examination	very good
Grade at the diploma	very good
Questions asked during the final examination	1. The data mining tasks and their short description. 2. The „agile" approach features from the point of view of the Manifesto. 3. What is a transaction in DataBase? What constraints are there for a transaction?
Type (nature of the work) and a brief description of the contents	The aim of the study was to use artificial neural networks to support melanoma detection. It is worth emphasizing the thorough analysis of the problem and the broad scope of the student's work.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements laid down for second-cycle degree students - it contains elements of a typical research project, which requires the author to formulate and solve a research problem on their own.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES

b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades are legitimate.

Graduate's full name (student's book number)	Jakub Jacek Ciwiński 7459
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle part-time studies
Degree programme / specialisation track	Computer Science / Software Engineering
Thesis title	Service to Train Neural Networks
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Waldemar Ptasznik-Kisieliński, BEng, MsC 4,5
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Ewa Figielska BEng, PhD 4,5
Overall grade	3,82
Grade awarded for the final examination	very good
Grade at the diploma	good
Questions asked during the final examination	1. The concepts of the front-end and the back-end of an application. 2. Characterise DevOps methodology. 3. Describe the phenomenon of network outfitting.
Type (nature of the work) and a brief description of the contents	The aim of the work was to design and make a web application to display a multi-layered neural network and train it with the use of backward error propagation. The work edition is highly imperfect.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation,	The thesis meets the requirements laid down for first - cycle degree students .

level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades are a bit inflated.

Graduate's full name (student's book number)	Monika Beata Piętka 7696
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	Second-cycle part-time studies
Degree programme / specialisation track	Computer Science / Project Management
Thesis title	Data Mining in Modelling the Risk Management Process
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Waldemar Łabuda, BEng, PhD 4,5
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Oleg Zaikin, BEng, PhD, DsC, ProfTit 4,5
Overall grade	3,91
Grade awarded for the final examination	good
Grade at the diploma	good
Questions asked during the final examination	1. PRINCE 2 model structure. 2. Characterise RUP methodology. What are numerical algorithms for?
Type (nature of the work) and a brief description of the contents	The purpose of the work was to prove the thesis that data mining techniques facilitate the understanding of

	available patterns and provide knowledge necessary in project and business risk management. It is worth emphasizing the thorough analysis of the problem and the broad scope of the student's work.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements laid down for second-cycle degree students - it contains elements of a typical research project, which requires the author to formulate and solve a research problem on their own.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades are legitimate.

Graduate's full name (student's book number)	Yerassyl Akhmer 8419
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	Second-cycle full-time studies
Degree programme / specialisation track	Computer Science / Project Management
Thesis title	Feature Selection for Classification Using a Genetic Algorithm
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Ewa Figielska, BEng, PhD 3,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Ryszard Wieleba, BEng, PhD 3,0
Overall grade	4,22
Grade awarded for the final examination	good

Grade at the diploma	good
Questions asked during the final examination	1. What does the term project mean? What are the differences between supervised and unsupervised learning? 3. What are the goals of database normalization?
Type (nature of the work) and a brief description of the contents	The thesis is devoted to methods of feature selection for classification using genetic algorithms. Automatic feature selection is introduced in order to obtain better object classification. Some doubts concern the tables with experimental results. They are identical to those in one publication from the Knowledge-Base Systems journal, which is not mentioned in the bibliography.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis barely meets the requirements laid down for second-cycle degree students .
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES, but the bibliography lacks the literature which the experimental results refer to.
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades are reasonable. The honest opinion on the thesis written by the supervisor (Ewa Figielska BEng, PhD) is particularly valuable.

Graduate's full name (student's book number)	Ayten Un 8420
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	Second-cycle full-time studies
Degree programme / specialisation track	Computer Science / Project Management

Thesis title	Artificial Intelligence in E-commerce
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Tomasz Michalak, PhD 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Ryszard Wieleba, BEng, PhD 4,0
Overall grade	4,48
Grade awarded for the final examination	very good
Grade at the diploma	very good
Questions asked during the final examination	1. Characterise briefly the „agile" approach to software development projects 2. Compare the relational and object- oriented approach to a database. 3.Explain the concept of Nash Equilibrium.
Type (nature of the work) and a brief description of the contents	The thesis is na interesting review of the subject but it lacks both experimental and implementation research. It is worth emphasizing the thorough analysis of the problem and the broad scope of the student's work.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements laid down for second-cycle degree graduates.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades for final thesis are reasonable.

Graduate's full name (student's book number)	Marcin Grzegorz Sęk 7259
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle part-time studies
Degree programme / specialisation track	Computer Science / Internet Engineering
Thesis title	Internet Service for Puzzle Solving
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Dariusz Kopciał, BEng, Phd 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Dariusz Pałka, BEng, Phd 4,5
Overall grade	3,78
Grade awarded for the final examination	very good
Grade at the diploma	good
Questions asked during the final examination	1. Internet services testing. 2. Software design and architectural patterns. 3. What are numerical algorithms for?
Type (nature of the work) and a brief description of the contents	The thesis features both engineering and deployment characteristics. It covers both conceptual and technological work. The author developed a fully operative internet service for puzzle solving. The student showed good practical skills in the employed technologies: ASP.NET Core, PostgreSQL, HTMLS, SCSS and JavaScript. A disadvantage of the thesis is very poor bibliography (four items) and poor reference to it throughout the work.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES

Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades for final thesis awarded by the supervisor and the reviewer are reasonable.

Graduate's full name (student's book number)	Paweł Pindelski 6819
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	Second-cycle part-time studies
Degree programme / specialisation track	Computer Science / ICT Systems
Thesis title	Usage Analysis of Unit Testing in Case of Some Computer Application.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Michał Grabowski, PhD, Dsc, WSCS ProfTit 4,5
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Robert Janowski, BEng, PhD 4,5
Overall grade	4,33
Grade awarded for the final examination	very good
Grade at the diploma	very good
Questions asked during the final examination	1. Programming tools at abstract level. 2. Advantages and disadvantages of object-oriented programming. 3. Numerical algorithms.
Type (nature of the work) and a brief description of the contents	The thesis contains studies related to the assumed subject hypothesis. The aim of the thesis was to evaluate selected ways of unit test writing. The author used appropriate software development methodology. The practical part of the thesis was the design and implementation of an application for unit test writing. The author developed requirements specification (both functional and non-functional), selected appropriate tools, modelled use cases, presented a model of the application in the form of a data-flow diagram and a

	class diagram. He also presented the way the application was implemented and tested.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades for final thesis awarded by the supervisor and the reviewer are reasonable.

Graduate's full name (student's book number)	Stanisław Minksztym 7266
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle part-time studies
Degree programme / specialisation track	Computer Science / Internet Engineering
Thesis title	Internet Classifieds for Selling Digital Commodities.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Piotr Kopcial, BEng, PhD 4,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Szymon Supernak, BEng, PhD 3,0
Overall grade	3,81
Grade awarded for the final examination	very good
Grade at the diploma	good

Questions asked during the final examination	1. Describe white box and black box testing. 2. Describe software development methods. 3. Why is RSA secure?
Type (nature of the work) and a brief description of the contents	The thesis features both engineering and deployment characteristics. The aim of the thesis was to prepare a web service to publish and sell products of Internet technologies developers. The thesis covers both conceptual and technological work. The author used technologies such as ASP.NET MVC and Mapping Entity Framework to implement the developed application. He presented the results of executed functional and security tests. The work was done according to the engineering model of software life-cycle.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grade for the final thesis awarded by the reviewer is reasonable but the grade given by the supervisor seems to be inflated.

Graduate's full name (student's book number)	Przemysław Wilk 7520
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle full-time studies

Degree programme / specialisation track	Computer Science / Database Systems Engineering
Thesis title	The Development of a Road Accident Analysis System Based on Data from General Police Headquarters.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Andrzej Ptasznik, BEng, MSc 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Ryszard Wieleba, BEng, PhD 5,0
Overall grade	3,83
Grade awarded for the final examination	very good
Grade at the diploma	fairly good
Questions asked during the final examination	1. Essential features of AI and directions of its development. 2. Describe the typed of tables in SQL Server 2017. 3. Provide the definition of *numerical stability.*
Type (nature of the work) and a brief description of the contents	The thesis of engineering and deployment characteristics. The thesis was aimed at devising an information and analysis portal together with appropriately designed database structure to present the results of road accidents analysis. The author formulated both functional and non-functional requirements for the analysis and presented use-case, class and activity diagrams. Additionally, he designed and described the proposed solution by means of a chosen technology, architecture, database and chosen interfaces. The author used Microsoft analytic tools (SQL Server and Business Intelligence). The literature the author refers to has been chosen correctly. The thesis is a good source of information concerning the design and implementation of database systems.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES

c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	The grades for final thesis awarded by the supervisor and the reviewer are reasonable.

Graduate's full name (student's book number)	Agnieszka Szajdecka 7541
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle part-time studies
Degree programme / specialisation track	Computer Science / Internet Engineering
Thesis title	A Simulation and Visualisation System to Study the Coexistence of Living Organisms.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Waldemar Ptasznik – Kisieliński, BEng, MSc 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Robert Miszczak, BEng, PhD 4,5
Overall grade	4,75
Grade awarded for the final examination	very good
Grade at the diploma	very good
Questions asked during the final examination	1. Compare XML and JSON documents. 2. The concept of the object design pattern. 3. The use of interfaces in the object-oriented programming.
Type (nature of the work) and a brief description of the contents	The thesis comprises design and analysis. The author proposed a system to model and analyse population behaviour in the environment. She formulated the project assumptions and then designed, implemented and tested the software. The thesis ends with conclusions.

Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements relevant for an engineering thesis with the general academic profile.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	Both the supervisor and the reviewer awarded legitimate grades and pointed out the author's original contribution to the presented subject. The reviewer noticed minor editorial mistakes.

Graduate's full name (student's book number)	Arkadiusz Paweł Sawicki 8494
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	Second-cycle part-time studies
Degree programme / specialisation track	Computer Science / Project Management
Thesis title	Analysis and Multi-criteria Functionality Evaluation of Tools Used to Support Information Systems Design.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Szymon Supernak, BEng, PhD 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Dariusz Pałka, BEng, PhD 5,0
Overall grade	4,61
Grade awarded for the final examination	very good
Grade at the diploma	very good

Questions asked during the final examination	1. Describe a selected model of software project management. 2. Characterise model transformation in AI design in CASE tools. 3. The role of data mining.
Type (nature of the work) and a brief description of the contents	The author researched and analysed the problem. The existing tools used to support information systems design served him to analyse the functionality of such systems. A multi-criteria functionality evaluation model was proposed. Experimental studies were conducted for typical design supporting tools. The thesis ends with conclusions. The obtained results can be published or used as laboratory assistance.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements relevant for a master's thesis with the general academic profile.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	Both the supervisor and the reviewer correctly assessed the thesis. They made a very thorough assessment of the student's workload and pointed to the author's individual contribution of work to the proposed problem solution.

3.1.

Graduate's full name (student's	Piotr Kamil Andziak 6672

book number)	
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) **Mode of study (full-time/part-time)**	Second-cycle full-time studies
Degree programme / specialisation track	Computer Science / Project Management
Thesis title	Ensemble Classification Algorithm Based on the Supervised Clustering - Implementation and Analysis
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Ewa Figielska, BEng, PhD 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Dariusz Pałka, BEng, PhD 4,5
Overall grade	4,39
Grade awarded for the final examination	very good
Grade at the diploma	very good

Questions asked during the final examination	1. Describe briefly the PMI approach to PM. 2. Characterise object- oriented paradigms? 3. What are the differences between the Information Management System and the Information Technology System?
Type (nature of the work) and a brief description of the contents	The thesis involves a design and scientific research. After describing fundamental notions of machine learning, the problem of supervised learning was discussed. On the basis of publications overview, composite classifiers were proposed. For selected algorithms computer programmes were developed and tested. The thesis ends with the experiment analysis and conclusions.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements relevant for a master's thesis with the general academic profile.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity	YES

of the contents and structure of the thesis with its topic	
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses	Both the supervisor and the reviewer awarded legitimate grades. The supervisor made a thorough assessment of the author's original contribution to the presented subject whereas the reviewer pointed to some minor shortcomings.

awarded by supervisors and reviewers	

Graduate's full name (student's book number)	Michał Tworkowski 6188
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle part-time studies
Degree programme / specialisation track	Computer Science / Internet Engineering
Thesis title	A Mobile Android Application to Support Progress Monitoring of Sports Results.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Szymon Smaga, MSc 3,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Ryszard Wieleba, BEng, PhD 3,0
Overall grade	4,11
Grade awarded for the final examination	good
Grade at the diploma	good
Questions asked during the final examination	1. The analysis of a problem domain and the selection of system classes. 2. Describe the notions of inheritance and compression in the object-oriented programming. 3. Define and characterise ORM.
Type (nature of the work) and a brief description of the contents	The thesis involved the design of a mobile Android application to support progress monitoring of sports results. After the introduction containing the principles of the mobile application design, an overview of existing solutions to support sports activity was presented. The design assumptions included functional, non-functional and legal requirements. Subsequently, a technology was proposed and the application was implemented. The thesis ends with the application tests and conclusions.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation,	The thesis meets the requirements relevant for an engineering thesis with the general academic profile.

level of study and general academic profile, including:	
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	Both the supervisor and the reviewer correctly assessed the thesis. They pointed to the author's individual contribution to the proposed problem solution but also to some shortcomings of his work.

Graduate's full name (student's book number)	Marcin Krupiński 7454
Cycle of studies (first-cycle/second-cycle/ long-cycle programme) Mode of study (full-time/part-time)	First-cycle full- time studies
Degree programme / specialisation track	Computer Science / Database Systems Engineering
Thesis title	Breeding Conditions Control in a Home Aquarium. The Design and Development of a Control Unit in the RISC Architecture.
Full name, degree/title of thesis supervisor and thesis grade awarded by the supervisor	Krzysztof Madziar, BEng, PhD 5,0
Full name, degree/title of thesis reviewer and thesis grade awarded by the reviewer	Kazimierz Drażba, MSc 3,5
Overall grade	4,2
Grade awarded for the final examination	very good
Grade at the diploma	fairly good
Questions asked during the final examination	1. Describe the object-oriented paradigm.

	2. The notion of a control unit. 3. Describe the communication channels commonly employed in control units used in your diploma work.
Type (nature of the work) and a brief description of the contents	The thesis is a project. A unit to automatically control the breeding conditions in a home aquarium was designed. First, the overview of the existing solutions was presented. Next, the requirements were gathered. Then, the choice of sensors and peripheral devices was made. Finally, a prototype of the subject device was constructed and tested.
Assessment of the degree, to which the thesis meets the requirements relevant for the field of study under evaluation, level of study and general academic profile, including:	The thesis meets the requirements relevant for an engineering thesis with the general academic profile.
a. conformity of the topic of the thesis with learning outcomes for the degree programme under assessment and its scope	YES
b. conformity of the contents and structure of the thesis with its topic	YES
c. correctness of applied methods, terminology, grammar and style	YES
d. selection of literature used in the thesis	YES
Does the thesis satisfy the criteria typical for master or bachelor of science degree theses if the programme leads to the award of an inżynier or magister inżynier qualification (bachelor of science or master of science degree)	YES
Legitimacy of grades for final theses awarded by supervisors and reviewers	In their evaluations both the reviewer and the supervisor pointed to the author's original contribution in the form of presented analyses and the developed prototype. The grade given by the supervisor is inflated. The reviewer rightly pointed out the lack of precise design assumptions and editorial errors which justify a lower grade.

Annex 4. List of courses/group of courses, for which staffing of classes is improper;

Name of the course or group of courses/cycle of studies/year of study	Full name, degree/title of the academic teacher	Justification

Annex 5. Information on inspected courses/group of courses and their assessment

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Operating Systems**, laboratory
Full name, degree/title of the academic teacher teaching the class	I. Lewicki, BEng, MSc
Specialisation track/mode (full-time/part-time) year/semester/group	Computer Science, full-time studies, 1st year
Date, time, room in which the classes are held	25 Oct 2019, room 209, 4.15-5.00pm
Field of study / specialisation track	Computer science
The number of students enrolled for the class/present in class	16/11
Topic of the class under inspection	Directory service
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	Entrance test from the previous laboratory (about 5 minutes). Discussion of current laboratory tasks.. The teacher maintains good contact with students.
b. conformity of the class topic with course/module syllabus	The lab topics consistent with the course syllabus
c. preparedness of the academic teacher for the class	The teacher prepared for the class
d. correctness of the selection of teaching methods	The teaching methods selected properly
e. correctness of the selection of teaching materials	The teaching materials selected properly
f. use of teaching infrastructure, information technology, access to apparatus, etc.	The teaching infrastructure prepared for laboratory classes. 24 computer workstations. A projector, a screen, a board available. Good conditions for computer skills practice.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Software Engineering II,** laboratory
Full name, degree/title of the academic teacher teaching the class	E. Figielska, BEng, PhD
Specialisation track/mode (full-time/part-time) year/semester/group	Software Engineering, full-time studies, 5th semester
Date, time, room in which the classes are held	25 Oct 2010, room 212, 8.50-10.30am
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	13/8
Topic of the class under inspection	Systems for calculating renovation costs
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	The teacher explains the objectives of the project. Descriptions in Polish and English. Good contact with students.
b. conformity of the class topic with course/module syllabus	The lab topics consistent with the course syllabus
c. preparedness of the academic teacher for the class	The teacher prepared for the class
d. correctness of the selection of teaching methods	Teaching methods selected properly
e. correctness of the selection of teaching materials	Teaching materials selected properly
f. use of teaching infrastructure, information technology, access to apparatus, etc.	The teaching infrastructure prepared for laboratory classes. 24 computer workstations. A projector, a screen, a board available. Good conditions for computer skills practice.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Introduction to Business**, lecture
Full name, degree/title of the academic teacher teaching the class	E. Cieślak, MSc
Specialisation track/mode (full-time/part-time) year/semester/group	Computer Science, 3rd year
Date, time, room in which the classes are held	25 Oct 2019, room 107, 2.20-2.50pm
Field of study / specialisation track	Computer Science

The number of students enrolled for the class/present in class	31 students present
Topic of the class under inspection	Conducting business activities – motivation
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	Excellent contact with the students. The students have a discussion with the teacher.
b. conformity of the class topic with course/module syllabus	The lecture topic conforms to the syllabus
c. preparedness of the academic teacher for the class	The teacher prepared very well for the class
d. correctness of the selection of teaching methods	The teaching methods selected properly
e. correctness of the selection of teaching materials	The teaching materials selected properly
f. use of teaching infrastructure, information technology, access to apparatus, etc.	The teaching infrastructure prepared for lecturing; the room equipped with two projectors, two screens and a board

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Introduction to Programming**, laboratory
Full name, degree/title of the academic teacher teaching the class	E. Figielska, BEng, PhD
Specialisation track/mode (full-time/part-time) year/semester/group	First-cycle full-time studies, 1st semester
Date, time, room in which the classes are held	25 Oct 2019, room 108, 10.15am
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	20/17
Topic of the class under inspection	Conditional instructions
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	Lively teacher performance. The use of a projector.
b. conformity of the class topic with course/module syllabus	The lecture topic conformed to the syllabus
c. preparedness of the academic teacher for the class	The teacher well-prepared for the lecture
d. correctness of the selection of teaching methods	Teaching methods carefully selected
e. correctness of the selection of teaching materials	Teaching materials selected properly

f. use of teaching infrastructure, information technology, access to apparatus, etc.	A projector, a big screen and computers available. Full use made of the teaching infrastructure.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**History of Computer Science ,** lecture
Full name, degree/title of the academic teacher teaching the class	Piotr Sienkiewicz, BEng, PhD, DSc, ProfTit
Specialisation track/mode (full-time/part-time) year/semester/group	First-cycle part-time studies, 1st semester
Date, time, room in which the classes are held	25 Oct 2029, room 105, 4.15pm
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	100/54
Topic of the class under inspection	Prehistory and history of computer science. Part II. The development of computer systems.
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	The lecturer used a well-prepared multimedia presentation.
b. conformity of the class topic with course/module syllabus	The lecture topic conformed to the syllabus
c. preparedness of the academic teacher for the class	The teacher prepared for the lecture
d. correctness of the selection of teaching methods	Teaching methods selected properly
e. correctness of the selection of teaching materials	Teaching materials selected correctly
f. use of teaching infrastructure, information technology, access to apparatus, etc.	A spacious lecture hall with a good PA system, two projectors and two screens. The lecturer made full use of the available teaching infrastructure.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Databases**, laboratory
Full name, degree/title of the academic teacher teaching the class	Jerzy Stankiewicz, BEng, MSc

Specialisation track/mode (full-time/part-time) year/semester/group	First-cycle part-time studies, 5th semester
Date, time, room in which the classes are held	25 Oct 2019, room 210, 4.15pm
Field of study / specialisation track	Computer Science, all specialisations
The number of students enrolled for the class/present in class	21/19
Topic of the class under inspection	Principles of access rights management
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	The teacher used the projector while the students made use of the computer workstations.
b. conformity of the class topic with course/module syllabus	The lab topic conformed to the course syllabus.
c. preparedness of the academic teacher for the class	The teacher well-prepared
d. correctness of the selection of teaching methods	Correct selection of the teaching methods
e. correctness of the selection of teaching materials	The choice of teaching material raises no objections.
f. use of teaching infrastructure, information technology, access to apparatus, etc.	Good use of the teaching infrastructure

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Operating Systems**, laboratory
Full name, degree/title of the academic teacher teaching the class	Ireneusz Lewicki, BEng, MSc
Specialisation track/mode (full-time/part-time) year/semester/group	First-cycle full-time studies, 1st year, 1st semester
Date, time, room in which the classes are held	25 Oct 2019, room 111, 10.35am-12.30pm
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	22/16
Topic of the class under inspection	Installation and configuration of ADDS service in Windows Server 2016 system
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	Classes in the computer laboratory. The teacher introduces a new topic and then checks the students' knowledge of the material from the last class by means of a short test. Next, he provides the correct answers to the short test questions. The teacher uses heuristic in teaching a new

	topic and gives the students theoretical background to the topic of the class.
b. conformity of the class topic with course/module syllabus	Full conformity of the lab topic with the course syllabus
c. preparedness of the academic teacher for the class	The teacher carefully prepared
d. correctness of the selection of teaching methods	Careful selection of the teaching materials
e. correctness of the selection of teaching materials	Careful selection of the teaching methods
f. use of teaching infrastructure, information technology, access to apparatus, etc.	The teacher uses 24 HP computer stations in the laboratory and the multimedia projector to display a PP presentation, as well as the whiteboard to explain crucial parts of the presented topic.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**User Applications**, laboratory
Full name, degree/title of the academic teacher teaching the class	Jerzy Stankiewicz, BEng, MSc
Specialisation track/mode (full-time/part-time) year/semester/group	First-cycle full-time studies, 1st year, 1st semester
Date, time, room in which the classes are held	26 Oct 2019, room 211, 8.00-9.35am
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	24/20
Topic of the class under inspection	Introduction to MS-Word (part II)
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	Classes in the computer laboratory. The teacher assigns tasks to students and monitors their performance at computer workstations. Finally, he provides the students with correct solutions and ways of their implementation. The teacher uses heuristic in teaching a new topic and gives the students theoretical background to the topic of the class.
b. conformity of the class topic with course/module syllabus	The lab topic fully conforms to the course syllabus.
c. preparedness of the academic teacher for the class	The teacher is adequately prepared for the lab class.
d. correctness of the selection of teaching methods	The teaching methods chosen properly

e. correctness of the selection of teaching materials	The teaching materials chosen properl.
f. use of teaching infrastructure, information technology, access to apparatus, etc.	The teacher uses the laboratory infrastructure: 24 computer workstations, a multimedia projector for PP presentations and a whiteboard to explain crucial parts of the presented topic.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	**Introduction to Programming**, laboratory
Full name, degree/title of the academic teacher teaching the class	R. Janowski, BEng, PhD
Specialisation track/mode (full-time/part-time) year/semester/group	Full-time studies, 1st year, 1st semester, group D103
Date, time, room in which the classes are held	25 Oct 2019 (Friday), room 212
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	23/20
Topic of the class under inspection	Functions and conditional instructions
Rating:	
a. form of activity in the class and the academic teacher's contact with the group	The lecturer first discusses the results of the previous laboratory and then introduces a new task. He explains the details and answers students' questions. Then the students carry out the task on their own. The teacher has a very good contact with the group.
b. conformity of the class topic with course/module syllabus	The lab topic conforms to the course syllabus. During the class, 14 tasks are performed to illustrate the lab topic. The current task was to prepare a program that would convert English units to SI system units (inch / foot / yard → meter and pound → kg).
c. preparedness of the academic teacher for the class	The teacher is competent, committed and well-prepared to conduct classes.
d. correctness of the selection of teaching methods	A correct teaching method. At first the teacher explains the task, and then students perform it themselves. Any doubts are resolved together with the teacher.
e. correctness of the selection of teaching materials	A well-chosen practical task to illustrate the use of the functions specified in the topic of the class. The teaching materials that help the students prepare to carry out the given tasks are available on the MOODLE Learning Platform.

f. use of teaching infrastructure, information technology, access to apparatus, etc.	A spacious, well-lit room, very well adapted to conduct laboratories. Students have individual access to computer workstations. The room has the equipment that allows multimedia presentations.

Names of courses/ group of courses, mode of class (lecture, tutorial, seminar, laboratory, language course, etc.)	English , classes
Full name, degree/title of the academic teacher teaching the class	Karolina Winszewska, MA
Specialisation track/mode (full-time/part-time) year/semester/group	Full-time studies, 1st year, 1st semester, group 102
Date, time, room in which the classes are held	25 Oct 2019 (Friday), room 19
Field of study / specialisation track	Computer Science
The number of students enrolled for the class/present in class	21 / 13
Topic of the class under inspection	Grammar. Types of computer systems
Rating: well run class	
a. form of activity in the class and the academic teacher's contact with the group	Very well organized group work. Grammar tasks and thematic issues carried out with the use of the previously prepared teaching materials. The teacher asks questions and the group responds willingly Good pace of classes.
b. conformity of the class topic with course/module syllabus	The class topic conforms to the course syllabus.
c. preparedness of the academic teacher for the class	The teacher is competent, committed and very well prepared.
d. correctness of the selection of teaching methods	Classes are divided into two parts. The first one is devoted to a new grammar issue. Students work in groups to practise sentence forms. The second part concentrates on mastering professional vocabulary.
e. correctness of the selection of teaching materials	Accurately selected material to present the topic. Teaching materials and other useful resources are available on the MOODLE Learning Platform.
f. use of teaching infrastructure, information technology, access to apparatus, etc.	A spacious, well-lit room, very well adapted to conduct classes

Annex 2

to the Statute of the Polish Accreditation Committee

Detailed criteria for programme assessment

General profile

Criterion 1. Structure of the study programme: concept of education, learning objectives and outcomes

Quality education standard 1.1

The concept of education and learning objectives: correspond to the strategy of the HEI; are covered by the discipline(s) to which the degree programme is assigned; are related to research activity carried out by the institution in that discipline; are geared towards the needs of social and economic stakeholders, and of the labour market in particular.

Quality education standard 1.2

Learning outcomes correspond to the concept of education and learning objectives and the discipline(-s) to which the degree programme is assigned, describe in an accurate, specific, realistic and verifiable manner knowledge, skills and social competences acquired by students, and correspond to the appropriate level of the Polish Qualifications Framework and the general profile.

Quality education standard 1.2a

In the case of degree programmes preparing for professions referred to in Art. 68(1) of the act, learning outcomes include the full scope of general and specific learning outcomes stipulated in education standards specified in the regulations issued on the strength of Art. 68(3) of the act.

Quality education standard 1.2b

Learning outcomes for degree programmes leading to the award of the qualification of *inżynier* or *magister inżynier* include the full scope of learning outcomes leading to the award of *inżynier* qualification featured in the second stage descriptors stipulated in regulations issued on the strength of Art. 7 Sec3 . of the Act of 22 December 2015 on Integrated Qualifications System (OJ of 2018 , items 2153 and 2245).

Criterion 2. Implementation of the study programme: programme contents, schedule for implementation of the study programme, forms and organisation of classes, teaching methods, student placements, organisation of the teaching and learning process

Quality education standard 2.1

Programme contents correspond to learning outcomes and take into account, in particular, the current state of knowledge and research methodology in the discipline(-s) to which the degree programme is assigned, as well as the results of research activities of the HEI in the discipline(-s).

Quality education standard 2.1a

In the case of degree programmes offering education for professions referred to in Article 68 (1) of the act, programme contents include the full scope of programme contents included in education standards specified in the regulations issued on the strength of Article 68 (3) of the act.

Quality education standard 2.2

The Schedule for the implementation of the study programme; the forms and organisation of courses; the number of semesters; the number of hours of classes taught directly by academic teachers or other persons teaching classes and the estimated workload of students calculated based on the number of ECTS credits enable students to achieve all learning outcomes.

Quality education standard 2.2a

In the case of degree programmes providing education for professions referred to in Article 68 (1) of the act, the schedule for the implementation of the study programme; the forms and organisation of courses; the number of semesters; the number of hours of classes conducted with the direct participation of academic teachers or other persons teaching classes, and the estimated workload of students calculated based on the number of ECTS credits comply with the rules and requirements contained in education standards specified in the regulations issued on the strength of Article 68 (3) of the act.

Quality education standard 2.3

Teaching methods are student-centred, motivate students to actively participate in the teaching and learning process and enable students to achieve learning outcomes, and, in particular, allow for the preparation for conducting research or participation in research.

Quality education standard 2.4

If the study programme includes student placements, their programme, organisation and supervision over their implementation, the selection of placement venues and the environment, in which they take place, as well as infrastructure and competence of placement supervisors ensure that the placements are carried out correctly and that the students achieve learning outcomes, especially those related to the acquisition of research competences.

Quality education standard 2.4a

In the case of degree programmes providing education for professions referred to in Article 68 (1) of the act, student placement programme, organisation and supervision over their implementation, the selection of placement venues and the environment, in which they take place, as well as infrastructure and competence of placement supervisors comply with the rules and requirements contained in education standards specified in the regulations issued on the strength of Article 68 (3) of the act.

Quality education standard 2.5

The organisation of the teaching process ensures effective use of time spent on teaching and learning and the verification and assessment of learning outcomes.

Quality education standard 2.5a

In the case of degree programmes providing education for professions referred to in Article 68 (1) of the act, the organisation of teaching and learning complies with the rules and requirements concerning the organisation of education contained in education standards specified in the regulations issued on the strength of Article 68 (3) of the act.

Criterion 3. Admission to studies, verification of learning outcomes achievement by students, giving credit for individual semesters and years and awarding diplomas

Quality education standard 3.1

Formally accepted and published, coherent and transparent conditions for the admission of candidates for studies, which allow for the selection of right candidates; rules for student progression, giving credit for individual semesters and years of studies, and for awarding diplomas; recognition of learning outcomes, periods of learning and qualifications obtained in higher education; and the validation of learning outcomes achieved as part of the learning process outside the system of higher education are applied.

Quality education standard 3.2

The system for learning outcomes verification enables the monitoring of students' progress and guarantees reliable assessment of the achievement of learning outcomes by the students. Verification and assessment methods used are student-centred, provide feedback on the achievement of learning outcomes, and motivate students to actively participate in teaching and learning. They also allow for the verification and assessment of all learning outcomes, including, in particular, preparation for conducting research or participation in research.

Quality education standard 3.2a

In the case of degree programmes providing education for professions referred to in Article 68 (1) of the act, the methods for learning outcomes verification comply with the rules and requirements concerning the organisation of education contained in education standards specified in the regulations issued on the strength of Article 68 (3) of the act.

Quality education standard 3.3

Mid-term and examination papers, student projects, placement journals (provided student placements are included in the study programme), diploma theses, students' academic/artistic or other achievements related to the degree programme, as well as documented graduates' standing in the labour market or their further education confirm that they have achieved the learning outcomes.

Criterion 4. Competence, experience, qualifications and the number of staff providing education. Staff development and in-service training

Quality education standard 4.1

Competence and experience, qualifications and the number of academic teachers and other persons teaching classes to students ensure that the classes are conducted correctly and that the students achieve their learning outcomes.

Quality education standard 4.1a

In the case of degree programmes providing education for professions referred to in Article 68 (1) of the act, competence, experience and qualifications of academic teachers and other persons teaching classes to students comply with the rules and requirements contained in education standards specified in the regulations issued on the strength of Article 68 (3) of the act.

Quality education standard 4.2

Staffing policy ensures the selection of academic teachers and other persons teaching classes, which is based on transparent rules and allows for the proper staging of classes. It takes into account regular assessment of teaching staff carried out with the participation of students. The results of such assessment are used in in-service staff training. The staffing policy creates conditions that stimulate staff's continuing development.

Criterion 5. Education infrastructure and resources used in the implementation of the study programme and their improvement

Quality education standard 5.1

Teaching, academic, library and IT infrastructure; technical equipment in classrooms and labs; teaching aids and resources; library, information, educational resources and laboratory test equipment, as well as infrastructure of other entities used for teaching classes are modern, allow for proper staging of classes and the achievement of learning outcomes by students. They also allow for the preparation for or participation in research and are adapted to the needs of people with disabilities in a way as to ensure their full participation in education and conducting research by them.

Quality education standard 5.1a

In the case of degree programmes providing education for professions referred to in Article 68(1) of the act, teaching and research infrastructure of HEIs, as well as infrastructure of other entities used for teaching classes comply with the rules and requirements concerning the organisation of

education contained in education standards specified in the regulations issued on the strength of Article 68(3) of the act.

Quality education standard 5.2

Teaching, research, library and IT infrastructure; technical equipment in classrooms and labs; teaching aids and resources; library, information, educational resources and laboratory test equipment are subject to regular inspections, in which students participate. The results of such inspections are taken into consideration in improvement measures.

Criterion 6. Cooperation with representatives of social and economic stakeholders on the development, implementation and improvement of the study programme and its impact on the development of the degree programme

Quality education standard 6.1

Cooperation with social and economic stakeholders, including employers, on the development, implementation and improvement of the study programme is ensured.

Quality education standard 6.2

Relations with social and economic stakeholders in relation to the study programme and their impact on the programme and its implementation are subject to regular reviews carried out with the participation of students. The results of reviews are taken into consideration in improvement measures.

Criterion 7. Conditions for and methods of improving the internationalisation of education provided as part of the degree programme

Quality education standard 7.1

Conditions conducive for the internationalisation of education provided as part of the degree programme are created in accordance with the adopted concept of education. Academic teachers are capable to teach and students are capable to learn in foreign languages; international mobility of students and academic teachers is supported; foreign language instruction is ensured, which results in a systematic improvement of internationalisation and in student and staff exchanges.

Quality education standard 7.2

The internationalisation of education is subject to regular reviews carried out with the participation of students. The results of reviews are taken into consideration in improvement measures.

Criterion 8. Supporting learning, social, academic or professional development of students and their entry on the labour market. Development and improvement of such support

Quality education standard 8.1

Students are offered comprehensive support in their learning. Such support: takes different forms, depending on learning outcomes; takes into account the diverse needs of students; promotes academic, social and professional development of students by ensuring the availability of academic

staff. The support includes providing assistance in learning; in the achievement of learning outcomes, and in preparing for or participating in research. It motivates students to achieve very good learning outcomes, and includes competent assistance in student matters provided by administration staff.

Quality education standard 8.2

Support provided to students in their learning is subject to regular reviews carried out with the participation of students. The results of reviews are taken into consideration in improvement measures.

Criterion 9. Public access to information about the study programme, conditions for its implementation and achieved results

Quality education standard 9.1

Public access to information about: the study programme; the implementation of teaching and learning processes as part of the degree programme; awarded qualifications; admission requirements; opportunities for further education; the employability of graduates, which is up-to-date, comprehensive, comprehensible and consistent with the needs of different audiences, is provided.

Quality education standard 9.2

The scope and quality of information about the degree programme is subject to regular reviews carried out with the participation of students. The results of reviews are taken into consideration in improvement measures.

Criterion 10. Quality assurance policy, designing, approving, monitoring, reviewing and improving the study programme

Quality education standard 10.1

The rules for designing, approving, and modifying the study programme have been formally adopted and applied. With a view of improving the quality of education, regular reviews of the study programme are conducted based on the results of analysis of reliable data and information and with the participation of internal stakeholders, including students, and external stakeholders.

Quality education standard 10.2

The quality of education provided as part of the degree programme is subject to regular external assessments of education quality, the results of which are made public and taken into consideration in quality improvement measures.


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