Załącznik nr 2 do uchwały nr 416 Senatu Politechniki Opolskiej z dnia 29.05.2024 r.

Załącznik nr 11 do Księgi Jakości Kształcenia

KARTA PROGRAMU STUDIÓW

Nazwa programu studiów **Computer Engineering**

Specjalności: przedmioty kierunkowe ogólne - KiOg

Nazwa wydziału **Wydział Elektrotechniki, Automatyki i Informatyki**

poziom studiów (I stopnia / II stopnia / jednolite studia magisterskie)	Studia pierwszego stopnia
profil studiów (ogólnoakademicki / praktyczny)	Ogólnoakademicki
forma studiów (stacjonarne / niestacjonarne)	Studia stacjonarne
program studiów obowiązuje od roku akademickiego	2024/2025
data i numer uchwały Senatu ustalającej program studiów	29.05.2024 Uchwała nr 416 Senatu Politechniki Opolskiej
data i numer uchwały Senatu ustalającej kierunkowe efekty uczenia się	29.05.2024 Uchwała nr 416 Senatu Politechniki Opolskiej
dyscyplina wiodąca (w ramach której będzie uzyskiwana ponad połowa efektów uczenia się) – podać udział procentowy	Informatyka Techniczna i Telekomunikacja - 75%
pozostałe dyscypliny – podać udział procentowy	Automatyka, Elektronika, Elektrotechnika i Technologie Kosmiczne - 25%
czas trwania studiów (w semestrach)	7 sem.
łączna liczba punktów ECTS (w tym praktyki)	KiOg - 210 Razem - 210
łączna liczba godzin w planie studiów (w tym praktyki)	KiOg - 2650 Razem - 2650

wymiar (godzinowy) praktyk zawodowych, zasady i forma ich odbywania oraz liczba punktów ECTS, jaką student musi uzyskać w ramach tych praktyk (jeśli program studiów przewiduje praktyki)	KiOg - godziny 160 punkty ECTS 6 Zasady i formę odbywania praktyk określono w karcie opisu przedmiotu oraz w Regulaminie praktyk studenckich w Politechnice Opolskiej.
tytuł zawodowy otrzymywany przez absolwenta	Inżynier
klasyfikacja ISCED	0613
związek z misją i strategią rozwoju Politechniki Opolskiej	Kształcenie na kierunku Informatyka jest zgodne z misją Politechniki Opolskiej oraz jej strategią rozwoju, uchwaloną przez Senat PO.
wymagania wstępne – oczekiwane kompetencje kandydata (szczególnie w przypadku studiów drugiego stopnia)	Kandydat ubiegający się o przyjęcie na studia stacjonarne I-go stopnia na kierunku Informatyka musi posiadać kwalifikacje decydujące o uzyskaniu świadectwa dojrzałości, Kandydat powinien posiadać podstawową wiedzę ogólną, znać podstawowe ekonomiczne, prawne i inne skutki różnych rodzajów działań, oraz potrafić wykorzystywać posiadaną wiedzę.
zasady rekrutacji (w tym: przedmioty kwalifikacyjne oraz ustalone dla nich współczynniki wagowe)	Podstawę przyjęcia na studia stacjonarne I stopnia stanowią wyniki egzaminu maturalnego (dojrzałości). Kryterium decydującym o przyjęciu na studia stacjonarne I stopnia jest wartość wskaźnika rankingowego (R) obliczanego w oparciu o liczbę punktów uzyskanych za egzaminie maturalnym (dojrzałości), z języka obcego nowożytnego oraz dwóch przedmiotów wybranych z grupy przedmiotów fizyka (z astronomią), informatyka, język polski, matematyka. W obliczaniu wskaźnika R, przedmioty mają następujące wagi: język polski oraz język obcy - waga 0,5. Pozostałe przedmioty mają wagę 2.0. Szczegółowe WARUNKI I TRYB REKRUTACJI NA STUDIA W POLITECHNICE OPOLSKIEJ są publikowane na stronie http://www.po.edu.pl w zakładce Rekrutacja i w informatorze dla kandydatów na studia na dany rok akademicki.
sposoby weryfikacji zakładanych efektów uczenia się	Opisy sposobów weryfikacji efektów uczenia się dla kierunku Informatyka studia stacjonarne I stopnia przedstawione są Kartach opisu przedmiotów. Weryfikacja założonych efektów uczenia się osiąganych przez studenta podczas realizacji zajęć dydaktycznych monitorowana jest zgodnie z Procedurą PO M-01 Księgi Jakości Kształcenia - Ocena i weryfikacja efektów uczenia się oraz programów studiów.

sumaryczne wskaźniki charakteryzujące program studiów, a w tym:	łączna liczba punktów ECTS, którą student uzyskuje w ramach zajęć z bezpośrednim udziałem nauczycieli akademickich lub innych osób prowadzących zajęcia	Specj. / ECTS kont. KiOg / 108
	łączna liczba punktów ECTS, którą student uzyskuje w ramach zajęć z zakresu nauk podstawowych, do których odnoszą się efekty uczenia się dla określonego programu studiów, poziomu i profilu studiów	KiOg - 34
	dla profilu praktycznego łączna liczba punktów ECTS przypisanych do zajęć związanych z praktycznym przygotowaniem zawodowym, dla profilu ogólnoakademickiego łączna liczba punktów ECTS przypisanych do zajęć związanych z prowadzonymi w uczelni badaniami naukowymi w dyscyplinie lub dyscyplinach, do których przyporządkowany jest kierunek studiów	KiOg - 143
	liczba punktów ECTS, którą student musi uzyskać w ramach zajęć z dziedziny nauk humanistycznych lub nauk społecznych	KiOg - 7
	w przypadku studiów stacjonarnych I stopnia lub jednolitych magisterskich liczba godzin zajęć z wychowania fizycznego	godziny 60
	liczba punktów ECTS objętych programem studiów uzyskiwana w ramach zajęć do wyboru	KiOg - 78

Program studiów zaopiniowany przez organ samorządu studenckiego.

Sylwetka absolwenta

Computer Engineering, Studia pierwszego stopnia, Studia stacjonarne,

Wiedza:

Absolwent po ukończeniu studiów I stopnia posiada wiedzę w następujących obszarach: w zakresie matematyki obejmującą logikę matematyczną, kombinatorykę, teorię liczb oraz metody probabilistyczne, podstawową wiedzę w zakresie fizyki i elektrotechniki, niezbędną do zrozumienia podstaw działania komputerów, urządzeń z nimi współpracujących oraz sieci komputerowych, elementarną wiedzę w zakresie metod pomiarowych, szacowania niepewności pomiarów i rachunku błędów, znajomość podstawowych technik pracy z grafiką wektorową, bitmapową oraz trójwymiarową, znajomość składni i semantyki języków programowania wykorzystywanych w budowaniu aplikacji, w tym środowiska .NET, znajomość podstawowych metod, technik i narzędzi kompilacji programów, pogłębioną wiedzę w zakresie programowania obiektowego, podstawową wiedzę w zakresie algorytmów i struktur danych, złożoności algorytmów oraz istoty problemów nierozstrzygalnych i niepodatnych, wiedzę z zakresu budowy i funkcjonowania systemów komputerowych, wiedzę z zakresu reprezentacji danych stało- i zmienno-przecinkowych oraz realizacji operacji logicznych i arytmetycznych, wiedzę z zakresu budowy i zadań współczesnych systemów operacyjnych, znajomość i rozumienie celów inżynierii oprogramowania, wiedzę na temat cyklu życia oprogramowania, metod specyfikacji wymagań systemowych oraz metod analizy strukturalnej i obiektowej, uporządkowaną wiedzę dotyczącą sieci komputerowych, protokołów sieciowych i ich wzajemnych relacji, wiedzę w zakresie podstaw projektowania sieci komputerowych zgodnie z obowiązującymi normami i standardami, wiedzę w zakresie urządzeń wchodzących w skład sieci teleinformatycznych, w tym układów bezprzewodowych oraz konfigurowania tych urządzeń w sieciach lokalnych i rozległych, znajomość podstawowych pojęć dotyczących projektowania relacyjnych baz danych: modelowania związków encji, współbieżnego przetwarzania transakcji, normalizacji, więzów integralności oraz dobrą znajomość języków SQL, PL/SQL, T-SQL, szczegółową wiedzę w zakresie zagrożeń bezpieczeństwa i podatności systemów i sieci komputerowych na zagrożenia; znajomość i rozumienie metod ochrony danych i zabezpieczeń systemów i sieci komputerowych, nowoczesnych algorytmów szyfrowania i uwierzytelniania wiadomości, wiedzę z zastosowania systemów wbudowanych oraz w zakresie terminologii przetwarzania sygnałów i analizy systemów, wiedzę w zakresie metod sztucznej inteligencji; znajomość m.in. budowy, działania i zastosowań sztucznych sieci neuronowych oraz systemów logiki rozmytej, znajomość technik, metod i narzędzi niezbędnych do budowy serwisów internetowych; znajomość podstawowych pojęć i zasad prawa ochrony własności intelektualnej, zasób słownictwa języka angielskiego niezbędny do komunikowania się w środowisku pracy.

Umiejętności:

Absolwent po ukończeniu studiów I stopnia posiada następujące umiejętności: potrafi tworzyć aplikacje z zastosowaniem języków programowania: C , C#, Java, Python; potrafi programować w środowisku .NET, potrafi zaprojektować i zaimplementować system informatyczny, potrafi zastosować odpowiedni algorytm do danego problemu

algorytmicznego, potrafi posługiwać się technikami programowania w asemblerze do tworzenia prostych aplikacji w 16 oraz 32 bitowym trybie pracy procesora (również z zastosowaniem koprocesora, systemu przerwań, itp.), posługuje się podstawowym aparatem matematycznym różnych działów matematyki oraz stosuje metody i pojęcia matematyki w problemach i algorytmach informatyki, potrafi wykonywać podstawowe operacje związane z konfigurowaniem i administrowaniem systemami operacyjnymi Windows oraz Linux, potrafi efektywnie zarządzać użytkownikami i grupami użytkowników oraz poprawnie zabezpieczyć system operacyjny przed niepowołanym dostępem, potrafi analizować modele obiektowe UML oraz dobrać i zastosować narzędzia CASE adekwatne do projektowania SI, potrafi – zgodnie z zadaną specyfikacją – zaprojektować i skonfigurować sieć komputerową, potrafi dokonać wyboru oraz zaprojektować odpowiednią strukturę łącza transmisji danych do rozwiązania określonego zadania, potrafi zaplanować i przeprowadzić eksperymenty, opracować i interpretować uzyskane wyniki, wyciągać i formułować właściwe wnioski, potrafi stosować podstawowe metody statystyczne do różnych zagadnień m.in. do weryfikacji hipotez, potrafi projektować i realizować hurtownie danych z wykorzystaniem narzędzi ORACLE oraz MS SQL Server; posiada umiejętność realizacji obiektowych baz danych z zastosowaniem ORACLE, potrafi przeprowadzić analizę problemu i zaproponować rozwiązanie algorytmiczne i programistyczne systemów bazodanowych, potrafi wykorzystać procesor sygnałowy i jego peryferia programując proste systemy wbudowane, potrafi dokonać wyboru oraz zaprojektować odpowiednią strukturę sztucznej sieci neuronowej (lub systemu rozmytego) do rozwiązania określonego zadania, potrafi wykorzystywać techniki, metody, narzędzia niezbędne do budowy serwisów internetowych, ma umiejętność samokształcenia się, potrafi porozumiewać się w języku angielskim w sytuacjach biznesowych; potrafi pozyskiwać informacje w języku angielskim, przetwarzać je i interpretować, potrafi pozyskiwać informacje z aktów prawnych oraz dokonywać ich interpretacji oraz wyciągać samodzielne wnioski i wyrażać opinie; potrafi ocenić wykonaną pracę zgodnie z prawem patentowym; potrafi dokonać wstępnej analizy ekonomicznej, potrafi pracować indywidualnie i w zespole, stosować zasady bezpieczeństwa i higieny pracy oraz oszacować czas potrzebny na realizację zleconego zadania zapewniający dotrzymanie terminów.

Kompetencje społeczne:

Absolwent po ukończeniu studiów I stopnia posiada następujące, ważniejsze kompetencje społeczne: rozumie potrzebę stałego dokształcania oraz uczenia się przez całe życie; potrafi w kreatywny sposób zastosować zdobytą wiedzę; potrafi zdobywać potrzebne informacje i dzielić się wiedzą z innymi, ma świadomość odpowiedzialności za pracę własną oraz gotowość podporządkowania się zasadom pracy w zespole, potrafi współdziałać i pracować w grupie, przyjmując w niej różne role, ma świadomość ważności przestrzegania zasad etyki zawodowej i społecznej, poszanowania różnorodności poglądów, ma świadomość ważności i rozumie pozatechniczne aspekty i skutki działalności inżynierskiej, w tym jej wpływu na środowisko, prawidłowo identyfikuje i rozstrzyga dylematy związane z wykonywaniem zawodu informatyka.

Knowledge:

Upon completion of I cycle studies, a graduate has knowledge in the following disciplines: mathematics, including mathematical logic, combinatorics, number theory and probability

methods, basic knowledge within the scope of physics and electro-technology necessary for understanding the bases for operation of computers, devices connected to them and computer networks. elementary knowledge within the scope of measurement methods, estimating uncertainty of measurement and calculus of errors, familiarity with basic techniques of working with vector, bitmap and three-dimensional graphics, familiarity with syntax and semantics of programming languages used in application development, including .NET environment. knowledge of basic methods, techniques and tools for program compilations, deep knowledge within the scope of object programming, basic knowledge within the scope of algorithm and data structures, algorithm complexity and the essence of undecidable and insusceptible problems, knowledge of computer system structure and functions knowledge from the scope of fixed-point and floating point data as well as performance of logical and arithmetic operations, knowledge within the scope of structure and tasks of modern operational systems, knowledge and understanding of software engineering aims, knowledge of the software life cycle, methods of system requirement specification and methods of structural and object analysis, structured knowledge on computer networks, network protocols and mutual relations, knowledge within the scope of developing computer networks, according to effective norms and standards, knowledge within the scope of devices in the tele-information network, including wireless structures and configuration of these devices in local and extensive networks, knowledge of basic terms concerning the development of relational data bases: modelling entity relationships, transaction concurrent computing, normalisation, integrity constraints and good knowledge of SQL, PL/SQL, T-SQL languages, detailed knowledge within the scope of security threats and vulnerability of computer systems and networks to threats; knowledge and understanding of data protection methods and system and computer network security devices, modern encoding algorithms and message authentication, knowledge of embedded systems and within the scope of terminology of signal processing and system analysis, knowledge within the scope of AI methods; familiarity with, e.g. structure, operation and application of artificial neural networks and fuzzy logic systems, familiarity with techniques, methods and tools necessary to develop internet services; familiarity of basic terms and legal regulations on intellectual property protection, a range of English vocabulary necessary to communicate in working environment.

Skills:

A graduate upon completion of I cycle studies has the following skills: can develop applications with programming languages: C. C#. Java, Python; can program in .NET environment, can develop and implement an IT system, can use an appropriate algorithm for a given algorithm problem, can use programming techniques in the assembler for developing simple applications in 16- and 32-bit processor operation mode (also with the use of floating-point unit, interruption system, etc.), uses basic mathematical skills from various mathematical domains and applies mathematical methods and terms to IT problems and algorithms, can perform simple operations connected with configuration and administration of Windows and Linux operational systems, can effectively manage users and user groups as well as correctly protect the operational system against unauthorised access, can analyse UML object models and select and use CASE tools adequate for SI development can - according to required specification - develop and configure a computer network, can select and develop appropriate structure for data transmission connection to solve a given task,

can plan and perform experiments, develop and interpret obtained results, draw and formulate appropriate conclusions, can apply basic statistical methods for various problems, e.g. for hypothesis verification, can develop and perform data warehouses with the use of ORACLE and MS SQL Server tools; can perform object data bases with the use of ORACLE, can conduct problem analysis and propose algorithm and programming solutions for data base systems, can use a signal processor and its peripheral devices when developing simple embedded systems, can select and develop appropriate structure for artificial neural system (or fuzzy system) to solve a given problem, can use techniques, methods, tools necessary to develop internet services, has a skill of self-development, can communicate in English in business situations; can find information in English, process and interpret it, can obtain information from legal acts and interpret it as well as draw independent conclusions and express opinions; can evaluate the performed work according to the patent law; can conduct initial economic analysis, can work individually and in a team, use principles of occupational health and safety as well as estimate the time necessary to perform an assigned task, ensuring meeting the deadlines.

Social competences:

A graduate upon completion of I cycle studies has the following important social competences: understands the need pf continuous education and learning for life; can creatively use the obtained knowledge; can obtain necessary information and share it with others, is aware of the responsibility for one’s work and is ready to observe the rules of team work, can cooperate and work in a team, taking on various roles, is aware of the importance of observing the principles of professional and social ethics, respect for variety of opinion, is aware how important engineer activity is, understands its non-technological aspects and consequences, including influence on the environment. correctly identifies and solves dilemmas connected with the profession of IT programmer.

Tabela kierunkowych efektów uczenia się

program studiów (kierunek studiów): **Computer Engineering** poziom studiów: **Studia pierwszego stopnia** profil studiów: **Ogólnoakademicki**	
symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)
Wiedza: zna i rozumie	
K1_W01	A student has knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems
K1_W02	A student knows basic topics in the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations.
K1_W03	A student has general knowledge of humanities and social education.
K1_W04	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.
K1_W05	A student has a general knowledge in the engineering disciplines associated with the computer science.
K1_W06	A student has knowedge in programming and software engineering. Understands basic processes in the computer systems' life cycle.
K1_W07	A student has knowledge in the computer networks and operating systems area.
K1_W08	A student has knowledge in data bases area.
K1_W09	A student has knowledge in computer graphics area.
K1_W10	A student has knowledge in selected methods of artificial intelligence and their applications in computer science.
Umiejętności: potrafi	
K1_U01	A student can utilize gained knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems.
K1_U02	A student can practicaly use his knowledge of the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations and perform economical evaluation of proposed engineering solutions.
K1_U03	A student can perceive metatechnical, system, social and ethical aspects of the proposed engineering tasks and their solutions.
K1_U04	A student can use a foreign language at the B2 level of the European language evaluation scale.
K1_U05	A student can individually plan and run a live-long self-education process.

K1_U06	A student can select the sources of informaction with the use of advanced ICT techniques in the correct way. He can validate and synthesize data from various sources.
K1_U07	A student can individually and in a team perform engineering tasks and run basic scientific research, interpret it’s results and make conclusions.
K1_U08	A student can use specialist terminology (also in a foreign language) and judge other opinions in a debate.
K1_U09	A student can utilize knowledge in the engineering disciplines associated with the computer science.
K1_U10	A student can design, according to a given specification, perform and maintain computer systems. Can provide a critical evaluation and propose improvements to existing solutions.
K1_U11	A student can design, according to a given specification, perform and maintain computer networks with appropriate methods and techniques.
K1_U12	A student can install, configure and administer operating systems, with the use of appropriate methods and techniques.
K1_U13	A student can design, according to a given specification, perform and maintain data bases with appropriate methods and techniques.
K1_U14	A student can use the tools for the processing and analysis of digital images, with appropriate methods and techniques.
K1_U15	A student can apply selected methods of AI to basics computer science tasks with appropriate methods and techniques.
Kompetencje społeczne: jest gotów do	
K1_K01	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.
K1_K02	A student is aware of the impact of the tasks performed on the social environment and the ability to act for the public interest.
K1_K03	A student can think and act entrepreneurially.
K1_K04	A student can act in accordance with ethics and respect to the professional tradition. Promotes a pro-quality culture and the right standards of behaviour both in the professional environment and private life.

Objaśnienia

Symbol efektu tworzą:
- litera K – wyróżnik efektów kierunkowych,
- liczba 1 – studia pierwszego stopnia,
- znak _ (podkreślnik),
- litery W, U lub K – oznaczenie kategorii efektów (W – wiedza, U – umiejętności, K – kompetencje społeczne),
- 01, … - numer efektu w obrębie danej kategorii, zapisany w postaci dwóch cyfr (numery 1-9 należy poprzedzić cyfrą 0).

Tabela odniesień efektów kierunkowych do charakterystyk drugiego stopnia Polskiej Ramy Kwalifikacji

(dla programów studiów przypisanych do więcej niż jednej dyscypliny)

program studiów (kierunek studiów): **Computer Engineering**
poziom studiów: **Studia pierwszego stopnia**
profil studiów: **Ogólnoakademicki**

dyscypliny naukowe tworzące obszar odniesienia:
1. Informatyka Techniczna i Telekomunikacja
2. Automatyka, Elektronika, Elektrotechnika i Technologie Kosmiczne

symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)	kod składnika opisu	waga (%) efektu kierunkowego do zbioru efektów uczenia się dla dyscypliny	
			1	2
Wiedza: zna i rozumie				
K1_W01	A student has knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems	P6S_WG	50	50
K1_W02	A student knows basic topics in the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations.	P6S_WK2 P6S_WK3	100	0
K1_W03	A student has general knowledge of humanities and social education.	P6S_WK1 P6S_WK2	75	25
K1_W04	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.	P6S_WG	75	25
K1_W05	A student has a general knowledge in the engineering disciplines associated with the computer science.	P6S_WG	0	100
K1_W06	A student has knowedge in programming and software engineering. Understands basic processes in the computer systems' life cycle.	P6S_WG	100	0
K1_W07	A student has knowledge in the computer networks and operating systems area.	P6S_WG	100	0
K1_W08	A student has knowledge in data bases area.	P6S_WG	100	0
K1_W09	A student has knowledge in computer graphics area.	P6S_WG	100	0
K1_W10	A student has knowledge in selected methods of artificial intelligence and their applications in computer science.	P6S_WG	30	70
Umiejętności: potrafi				
K1_U01	A student can utilize gained knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems.	P6S_UK1	50	50
K1_U02	A student can practicaly use his knowledge of the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations and perform economical evaluation of proposed engineering solutions.	P6S_UO1	75	25
K1_U03	A student can perceive metatechnical, system, social and ethical aspects of the proposed engineering tasks and their solutions.	P6S_UO2	50	50
K1_U04	A student can use a foreign language at the B2 level of the European language evaluation scale.	P6S_UK3	100	0
K1_U05	A student can individually plan and run a live-long self-education process.	P6S_UU	50	50
K1_U06	A student can select the sources of informaction with the use of advanced ICT techniques in the correct way. He can validate and synthesize data from various sources.	P6S_UW	100	0
K1_U07	A student can individually and in a team perform engineering tasks and run basic scientific research, interpret it's results and make conclusions.	P6S_UO1 P6S_UO2	50	50
K1_U08	A student can use specialist terminology (also in a foreign language) and judge other opinions in a debate.	P6S_UK1 P6S_UK2 P6S_UK3	100	0
K1_U09	A student can utilize knowledge in the engineering disciplines associated with the computer science.	P6S_UW	0	100
K1_U10	A student can design, according to a given specification, perform and maintain computer systems. Can provide a critical evaluation and propose improvements to existing solutions.	P6S_UW	100	0
K1_U11	A student can design, according to a given specification, perform and maintain computer networks with appropriate methods and techniques.	P6S_UW	100	0
K1_U12	A student can install, configure and administer operating systems, with the use of appropriate methods and techniques.	P6S_UW	100	0
K1_U13	A student can design, according to a given specification, perform and maintain data bases with appropriate methods and techniques.	P6S_UW	100	0

K1_U14	A student can use the tools for the processing and analysis of digital images, with appropriate methods and techniques.	P6S_UW	80	20
K1_U15	A student can apply selected methods of AI to basics computer science tasks with appropriate methods and techniques.	P6S_UW	30	70
Kompetencje społeczne: jest gotów do				
K1_K01	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	P6S_KK1 P6S_KO3	75	25
K1_K02	A student is aware of the impact of the tasks performed on the social environment and the ability to act for the public interest.	P6S_KO1 P6S_KO2 P6S_KO2 P6S_KR	75	25
K1_K03	A student can think and act entrepreneurially.	P6S_KO3	75	25
K1_K04	A student can act in accordance with ethics and respect to the professional tradition. Promotes a pro-quality culture and the right standards of behaviour both in the professional environment and private life.	P6S_KK2 P6S_KO2 P6S_KR	75	25

Uniwersalne charakterystyki poziomu 6 Polskiej Ramy Kwalifikacji zostały uwzględnione

Tabela pokrycia charakterystyk drugiego stopnia Polskiej Ramy Kwalifikacji przez kierunkowe efekty uczenia się
(dla programów studiów przypisanych do więcej niż jednej dyscypliny)

program studiów (kierunek studiów): **Computer Engineering** poziom studiów: **Studia pierwszego stopnia** profil studiów: **Ogólnoakademicki** dyscypliny naukowe tworzące obszar odniesienia: 1. Informatyka Techniczna i Telekomunikacja 2. Automatyka, Elektronika, Elektrotechnika i Technologie Kosmiczne		
kod składnika opisu	charakterystyki drugiego stopnia Polskiej Ramy Kwalifikacji	symbol kierunkowych efektów uczenia się
1. Efekty uczenia się w zakresie dyscypliny: Informatyka Techniczna i Telekomunikacja		
Wiedza: zna i rozumie		
P6S_WG	Zna i rozumie w zaawansowanym stopniu – wybrane fakty, obiekty i zjawiska oraz dotyczące ich metody i teorie wyjaśniające złożone zależności między nimi, stanowiące podstawową wiedzę ogólną z zakresu dyscyplin naukowych lub artystycznych tworzących podstawy teoretyczne oraz wybrane zagadnienia z zakresu wiedzy szczegółowej – właściwe dla programu studiów.	K1_W01 K1_W04 K1_W06 K1_W07 K1_W08 K1_W09 K1_W10
P6S_WK1	Zna i rozumie fundamentalne dylematy współczesnej cywilizacji.	K1_W03
P6S_WK2	Zna i rozumie podstawowe ekonomiczne, prawne, etyczne i inne uwarunkowania różnych rodzajów działalności zawodowej związanej z kierunkiem studiów, w tym podstawowe pojęcia i zasady z zakresu ochrony własności przemysłowej i prawa autorskiego.	K1_W02 K1_W03
P6S_WK3	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form przedsiębiorczości.	K1_W02
Umiejętności: potrafi		
P6S_UK1	Potrafi komunikować się z otoczeniem z użyciem specjalistycznej terminologii.	K1_U01 K1_U08
P6S_UK2	Potrafi brać udział w debacie – przedstawiać i oceniać różne opinie i stanowiska oraz dyskutować o nich.	K1_U08
P6S_UK3	Potrafi posługiwać się językiem obcym na poziomie B2 Europejskiego Systemu Opisu Kształcenia Językowego.	K1_U04 K1_U08
P6S_UO1	Potrafi planować i organizować pracę indywidualną oraz w zespole.	K1_U02 K1_U07
P6S_UO2	Potrafi współdziałać z innymi osobami w ramach prac zespołowych (także o charakterze interdyscyplinarnym).	K1_U03 K1_U07
P6S_UU	Potrafi samodzielnie planować i realizować własne uczenie się przez całe życie.	K1_U05

P6S_UW	Potrafi wykorzystywać posiadaną wiedzę – formułować i rozwiązywać złożone i nietypowe problemy oraz wykonywać zadania w warunkach nie w pełni przewidywalnych przez: - właściwy dobór źródeł i informacji z nich pochodzących, dokonywanie oceny, krytycznej analizy i syntezy tych informacji, - dobór oraz stosowanie właściwych metod i narzędzi, w tym zaawansowanych technik informacyjno-komunikacyjnych.	K1_U06 K1_U10 K1_U11 K1_U12 K1_U13 K1_U14 K1_U15
Kompetencje społeczne: jest gotów do		
P6S_KK1	Jest gotów do krytycznej oceny posiadanej wiedzy i odbieranych treści.	K1_K01
P6S_KK2	Jest gotów do uznawania znaczenia wiedzy w rozwiązywaniu problemów poznawczych i praktycznych oraz zasięgania opinii ekspertów w przypadku trudności z samodzielnym rozwiązaniem problemu.	K1_K04
P6S_KO1	Jest gotów do wypełniania zobowiązań społecznych, współorganizowania działalności na rzecz środowiska społecznego.	K1_K02
P6S_KO2	Jest gotów do inicjowania działań na rzecz interesu publicznego.	K1_K02 K1_K02 K1_K04
P6S_KO3	Jest gotów do myślenia i działania w sposób przedsiębiorczy.	K1_K01 K1_K03
P6S_KR	Jest gotów do odpowiedzialnego pełnienia ról zawodowych, w tym: - przestrzegania zasad etyki zawodowej i wymagania tego od innych, - dbałości o dorobek i tradycje zawodu.	K1_K02 K1_K04
2. Efekty uczenia się w zakresie dyscypliny: Automatyka, Elektronika, Elektrotechnika i Technologie Kosmiczne		
Wiedza: zna i rozumie		
P6S_WG	Zna i rozumie w zaawansowanym stopniu – wybrane fakty, obiekty i zjawiska oraz dotyczące ich metody i teorie wyjaśniające złożone zależności między nimi, stanowiące podstawową wiedzę ogólną z zakresu dyscyplin naukowych lub artystycznych tworzących podstawy teoretyczne oraz wybrane zagadnienia z zakresu wiedzy szczegółowej – właściwe dla programu studiów.	K1_W01 K1_W04 K1_W05 K1_W10
P6S_WK1	Zna i rozumie fundamentalne dylematy współczesnej cywilizacji.	K1_W03
P6S_WK2	Zna i rozumie podstawowe ekonomiczne, prawne, etyczne i inne uwarunkowania różnych rodzajów działalności zawodowej związanej z kierunkiem studiów, w tym podstawowe pojęcia i zasady z zakresu ochrony własności przemysłowej i prawa autorskiego.	K1_W03
P6S_WK3	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form przedsiębiorczości.	
Umiejętności: potrafi		
P6S_UK1	Potrafi komunikować się z otoczeniem z użyciem specjalistycznej terminologii.	K1_U01
P6S_UK2	Potrafi brać udział w debacie – przedstawiać i oceniać różne opinie i stanowiska oraz dyskutować o nich.	
P6S_UK3	Potrafi posługiwać się językiem obcym na poziomie B2 Europejskiego Systemu Opisu Kształcenia Językowego.	

P6S_UO1	Potrafi planować i organizować pracę indywidualną oraz w zespole.	K1_U02 K1_U07
P6S_UO2	Potrafi współdziałać z innymi osobami w ramach prac zespołowych (także o charakterze interdyscyplinarnym).	K1_U03 K1_U07
P6S_UU	Potrafi samodzielnie planować i realizować własne uczenie się przez całe życie.	K1_U05
P6S_UW	Potrafi wykorzystywać posiadaną wiedzę – formułować i rozwiązywać złożone i nietypowe problemy oraz wykonywać zadania w warunkach nie w pełni przewidywalnych przez: - właściwy dobór źródeł i informacji z nich pochodzących, dokonywanie oceny, krytycznej analizy i syntezy tych informacji, - dobór oraz stosowanie właściwych metod i narzędzi, w tym zaawansowanych technik informacyjno-komunikacyjnych.	K1_U09
Kompetencje społeczne: jest gotów do		
P6S_KK1	Jest gotów do krytycznej oceny posiadanej wiedzy i odbieranych treści.	
P6S_KK2	Jest gotów do uznawania znaczenia wiedzy w rozwiązywaniu problemów poznawczych i praktycznych oraz zasięgania opinii ekspertów w przypadku trudności z samodzielnym rozwiązaniem problemu.	
P6S_KO1	Jest gotów do wypełniania zobowiązań społecznych, współorganizowania działalności na rzecz środowiska społecznego.	
P6S_KO2	Jest gotów do inicjowania działań na rzecz interesu publicznego.	K1_K02 K1_K04
P6S_KO3	Jest gotów do myślenia i działania w sposób przedsiębiorczy.	K1_K01 K1_K03
P6S_KR	Jest gotów do odpowiedzialnego pełnienia ról zawodowych, w tym: - przestrzegania zasad etyki zawodowej i wymagania tego od innych, - dbałości o dorobek i tradycje zawodu.	K1_K02 K1_K04

Tabela odniesień kierunkowych efektów uczenia się do uzyskania kompetencji inżynierskich Polskiej Ramy Kwalifikacji

program studiów (kierunek studiów): **Computer Engineering** poziom studiów: **Studia pierwszego stopnia** profil studiów: **Ogólnoakademicki**		
symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)	kod składnika opisu
Wiedza: zna i rozumie		
K1_W01	A student has knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems	
K1_W02	A student knows basic topics in the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations.	P6S_WK
K1_W03	A student has general knowledge of humanities and social education.	
K1_W04	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.	
K1_W05	A student has a general knowledge in the engineering disciplines associated with the computer science.	P6S_WG
K1_W06	A student has knowedge in programming and software engineering. Understands basic processes in the computer systems' life cycle.	P6S_WG
K1_W07	A student has knowledge in the computer networks and operating systems area.	P6S_WG
K1_W08	A student has knowledge in data bases area.	P6S_WG
K1_W09	A student has knowledge in computer graphics area.	P6S_WG
K1_W10	A student has knowledge in selected methods of artificial intelligence and their applications in computer science.	P6S_WG
Umiejętności: potrafi		
K1_U01	A student can utilize gained knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems.	P6S_UW3
K1_U02	A student can practicaly use his knowledge of the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations and perform economical evaluation of proposed engineering solutions.	
K1_U03	A student can perceive metatechnical, system, social and ethical aspects of the proposed engineering tasks and their solutions.	
K1_U04	A student can use a foreign language at the B2 level of the European language evaluation scale.	
K1_U05	A student can individually plan and run a live-long self-education process.	

K1_U06	A student can select the sources of informaction with the use of advanced ICT techniques in the correct way. He can validate and synthesize data from various sources.	P6S_UW3
K1_U07	A student can individually and in a team perform engineering tasks and run basic scientific research, interpret it’s results and make conclusions.	P6S_UW1
K1_U08	A student can use specialist terminology (also in a foreign language) and judge other opinions in a debate.	
K1_U09	A student can utilize knowledge in the engineering disciplines associated with the computer science.	P6S_UW1 P6S_UW4
K1_U10	A student can design, according to a given specification, perform and maintain computer systems. Can provide a critical evaluation and propose improvements to existing solutions.	P6S_UW2 P6S_UW4
K1_U11	A student can design, according to a given specification, perform and maintain computer networks with appropriate methods and techniques.	P6S_UW3 P6S_UW4
K1_U12	A student can install, configure and administer operating systems, with the use of appropriate methods and techniques.	P6S_UW2
K1_U13	A student can design, according to a given specification, perform and maintain data bases with appropriate methods and techniques.	P6S_UW2
K1_U14	A student can use the tools for the processing and analysis of digital images, with appropriate methods and techniques.	P6S_UW3
K1_U15	A student can apply selected methods of AI to basics computer science tasks with appropriate methods and techniques.	P6S_UW2
Kompetencje społeczne: jest gotów do		
K1_K01	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	
K1_K02	A student is aware of the impact of the tasks performed on the social environment and the ability to act for the public interest.	
K1_K03	A student can think and act entrepreneurially.	
K1_K04	A student can act in accordance with ethics and respect to the professional tradition. Promotes a pro-quality culture and the right standards of behaviour both in the professional environment and private life.	

Tabela pokrycia kompetencji inżynierskich Polskiej Ramy Kwalifikacji przez kierunkowe efekty uczenia się

program studiów (kierunek studiów): **Computer Engineering** poziom studiów: **Studia pierwszego stopnia** profil studiów: **Ogólnoakademicki**		
kod składnika opisu	charakterystyki drugiego stopnia Polskiej Ramy Kwalifikacji	symbol kierunkowych efektów uczenia się
Wiedza: zna i rozumie		
P6S_WG	Zna i rozumie podstawowe procesy zachodzące w cyklu życia urządzeń, obiektów i systemów technicznych.	K1_W05 K1_W06 K1_W07 K1_W08 K1_W09 K1_W10
P6S_WK	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form indywidualnej przedsiębiorczości.	K1_W02
Umiejętności: potrafi		
P6S_UW1	Potrafi planować i przeprowadzać eksperymenty, w tym pomiary i symulacje komputerowe, interpretować uzyskane wyniki i wyciągać wnioski.	K1_U07 K1_U09
P6S_UW2	Potrafi przy identyfikacji i formułowaniu specyfikacji zadań inżynierskich oraz ich rozwiązywaniu: - wykorzystywać metody analityczne, symulacyjne i eksperymentalne, - dostrzegać ich aspekty systemowe i pozatechniczne, w tym aspekty etyczne, - dokonywać wstępnej oceny ekonomicznej proponowanych rozwiązań podejmowanych działań inżynierskich.	K1_U10 K1_U12 K1_U13 K1_U15
P6S_UW3	Potrafi dokonywać krytycznej analizy sposobu funkcjonowania istniejących rozwiązań technicznych i oceniać ich rozwiązania.	K1_U01 K1_U06 K1_U11 K1_U14
P6S_UW4	Potrafi projektować - zgodnie z zadaną specyfikacją - oraz wykonywać typowe dla kierunku studiów proste urządzenia, obiekty, systemy lub realizować procesy, używając odpowiednio dobranych metod, technik, narzędzi i materiałów.	K1_U09 K1_U10 K1_U11

Wydział Elektrotechniki, Automatyki i Informatyki

POLITECHNIKA OPOLSKA

Plan studiów
Study plan

Kierunek studiów – Field of study

- COMPUTER ENGINEERING

- INFORMATYKA

Studia stacjonarne
pierwszego stopnia

First Cycle Programme – Full-Time Studies

CHARAKTERYSTYKA OGÓLNA

kierunek studiów: COMPUTER ENGINEERING

profil: OGÓLNOAKADEMICKI

nazwa wydziału: WYDZIAŁ ELEKTROTECHNIKI, AUTOMATYKI I INFORMATYKI

plan studiów	uchwała Senatu PO z dnia	nr 416 Senatu PO z dn.29.05.2024r.
	obowiązuje od roku akademickiego	**2024/2025**
forma studiów (stacjonarne / niestacjonarne)		**stacjonarne**
poziom studiów (I stopnia / II stopnia)		**I-go stopnia**
czas trwania (w sem.)		**7**
tytuł zawodowy otrzymywany przez absolwenta		**Inżynier**
liczba punktów ECTS		**210**

PLAN STUDIÓW – STUDY PLAN

POLITECHNIKA OPOLSKA WYDZIAŁ ELEKTROTECHNIKI, AUTOMATYKI I INFORMATYKI	**OPOLE UNIVERSITY OF TECHNOLOGY FACULTY OF ELECTRICAL ENGINEERING, AUTOMATIC CONTROL AND INFORMATICS**
Kierunek studiów:	**Field of study:**
COMPUTER ENGINEERING	**INFORMATYKA**
STUDIA STACJONARNE PIERWSZEGO STOPNIA – INŻYNIERSKIE	
FIRST CYCLE PROGRAMME - FULL-TIME STUDIES *(Engineer's degree)*	

SEMESTR: 1 (1st Semester)		**Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam**					**ECTS**	TYP
Nr	**Przedmiot**	**W**	**C**	**L**	**P**	**S**		
	Subject unit – semester curricular	**(Lecture)**	**(Practical classes)**	**(Laboratory classes)**	**(Project)**	**(Seminar)**		
1.1	Programming I Programowanie I	**30**	**-**	**30**	**-**	**-**	**4**	K
1.2	Algorithms and data structures Algorytmy i struktury danych	**30E**	**30**	**-**	**-**	**-**	**5**	K
1.3	Physics I Fizyka I	**30E**	**15**	**-**	**-**	**-**	**5**	P
1.4	Mathematical analysis I Analiza matematyczna I	**30**	**30**	**-**	**-**	**-**	**4**	P
1.5	Linear algebra with analytic geometry Algebra liniowa z geometrią analityczną	**30E**	**30**	**-**	**-**	**-**	**5**	P
1.6	Information technology Technologia informacyjna	**15**	**15**	**-**	**-**	**-**	**2**	P
1.7	Work safety and ergonomic Bezpieczeństwo pracy i ergonomia	**15**	**-**	**-**	**-**	**-**	**1**	P
1.8	Copyright and economy law Prawo autorskie i gospodarcze	**30**	**-**	**-**	**-**	**-**	**2**	HS
Przedmioty humanistyczne lub społeczne wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							**2**	
1.9	The course in humanities and social sciences I Przedmiot humanistyczno-społeczny I	**30**	**-**	**-**	**-**	**-**	**(2)**	W-HS
Liczba godzin w semestrze (Number of hours in a semester)		**240**	**150**				**30**	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		**390**						

SEMESTR: 2 (2nd Semester)		Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam					ECTS	TYP
Nr	Przedmiot Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
2.1	Programming II Programowanie II	30E	-	30	-	-	5	K
2.2	Database basics Podstawy baz danych	30	-	15	-	-	4	K
2.3	Architecture of computers Architektura komputerów	30E	-	30	-	-	5	K
2.4	Electrical engineering for IT specialists Elektrotechnika dla informatyków	30	30	-	-	-	4	P
2.5	Logic and set theory Logika i teoria mnogości	15	15	-	-	-	2	P
2.6	Mathematical analysis II Analiza matematyczna II	15E	15	-	-	-	3	P
2.7	Statistical methods Metody statystyczne	15	15	-	-	-	2	P
2.8	Physics II Fizyka II	15	-	15	-	-	2	P
Przedmioty humanistyczne lub społeczne wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							3	
2.9	The course in humanities and social sciences II Przedmiot humanistyczno-społeczny II	30	-	-	-	-	(3)	W-HS
Liczba godzin w semestrze (Number of hours in a semester)		210	165				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		375						

SEMESTR: 3 (3rd Semester)		Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam					ECTS	TYP
Nr	Przedmiot Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
3.1	Operating systems I Systemy operacyjne I	30E	-	30	-	-	5	K
3.2	Internet technologies Technologie internetowe	30	-	-	30	-	5	K
3.3	Programming III Programowanie III	30E	-	30	-	-	5	K
3.4	Computer aided design I Komputerowe wspomaganie projektowania I	30	-	15	-	-	3	K
3.5	Computer networks I Sieci komputerowe I	30	-	30	-	-	5	K
3.6	Database modelling Modelowanie baz danych	30E	-	30	-	-	5	K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
3.7	Physical education Wychowanie fizyczne	-	30	-	-	-	(0)	W
3.8	Foreign language Język obcy	-	-	30	-	-	(2)	W
	Foreign language Język obcy	-	-	30	-	-	(2)	W
Liczba godzin w semestrze (Number of hours in a semester)		180	225				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		405						

SEMESTR: 4 (4th Semester)		Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam					ECTS	TYP
Nr	Przedmiot Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
4.1	Software engineering Inżynieria oprogramowania	30E	30	-	-	-	5	K
4.2	Programming IV Programowanie IV	30	-	-	30	-	4	K
4.3	Operating systems II Systemy operacyjne II	30	-	30	-	-	5	K
4.4	Computer graphics I Grafika komputerowa I	30E	-	15	-	-	5	K
4.5	Computer networks II Sieci komputerowe II	30E	-	30	-	-	5	K
4.6	Discrete mathematics Matematyka dyskretna	15	15	-	-	-	2	P
4.7	Numerical methods Metody numeryczne	15	-	15	-	-	2	K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
4.8	Foreign language Język obcy	-	-	30	-	-	(2)	W
	Foreign language Język obcy	-	-	30	-	-	(2)	W
4.9	Physical education Wychowanie fizyczne	-	30	-	-	-	(0)	W
Liczba godzin w semestrze (Number of hours in a semester)		180	225				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		405						

SEMESTR: 5 (5th Semester)		Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam					ECTS	TYP
Nr	Przedmiot Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
5.1	Basics of artificial intelligence Podstawy sztucznej inteligencji	30E	-	15	-	-	5	K
5.2	Team project of IT system Projekt zespołowy systemu informatycznego	30E	-	-	30	-	5	K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
5.3	Foreign language Język obcy	-	-	30	-	-	(2)	W
	Foreign language Język obcy	-	-	30	-	-	(2)	W
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							18	
5.4	Elective course III - Computer graphics II Przedmiot wybieralny III - Grafika komputerowa II	30	-	-	15	-	(4)	W-K
	Elective course III - Vision systems Przedmiot wybieralny III - Systemy wizyjne	30	-	-	15	-	(4)	W-K
5.5	Elective course IV - Administration of network operating systems Przedmiot wybieralny IV - Administracja sieciowymi systemami operacyjnymi	15	-	30	-	-	(4)	W-K
	Elective course IV - System programming Przedmiot wybieralny IV - Programowanie systemowe	15	-	30	-	-	(4)	W-K
5.6	Elective course V - Fundamentals of control engineering Przedmiot wybieralny V - Podstawy automatyki	15	-	15	-	-	(2)	W-K
	Elective course V - Fundamentals of systems theory Przedmiot wybieralny V - Podstawy teorii systemów	15	-	15	-	-	(2)	W-K
5.7	Elective course II - Designing internet solutions Przedmiot wybieralny II - Projektowanie rozwiązań internetowych	15	-	-	15	-	(3)	W-K
	Elective course II - Embedded systems Przedmiot wybieralny II - Systemy wbudowane	15	-	-	15	-	(3)	W-K
5.8	Elective course I - Good software development practices Przedmiot wybieralny I - Dobre praktyki wytwarzania oprogramowania	30E	-	15	-	-	(5)	W-K
	Elective course I - Testing applications and systems Przedmiot wybieralny I - Testowanie aplikacji i systemów	30E	-	15	-	-	(5)	W-K

Liczba godzin w semestrze (Number of hours in a semester)	**165**	**165**	**30**	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)	**330**			

SEMESTR: 6 (6th Semester)		Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam					ECTS	TYP
Nr	Przedmiot Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
6.1	User experience design Projektowanie zorientowane na użytkownika	15	-	-	30	-	4	K
6.2	Artificial intelligence tools Narzędzia sztucznej inteligencji	15	-	-	30	-	4	K
6.3	Methodology for scientific research Metodyka badań naukowych	15	30	-	-	-	2	P
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							18	
6.4	Elective course IX - Data protection in applications Przedmiot wybieralny IX - Ochrona danych w aplikacjach	15	-	-	15	-	(2)	W-K
	Elective course IX - Data protection in systems and computer networks Przedmiot wybieralny IX - Ochrona danych w systemach i sieciach komputerowych	15	-	-	15	-	(2)	W-K
6.5	Transitional project Praca przejściowa	-	-	-	30	-	(3)	W-K
6.6	Elective course VIII - Administration of enterprise network infrastructure Przedmiot wybieralny VIII - Administracja infrastrukturą sieciową przedsiębiorstwa	30E	-	15	-	-	(5)	W-K
	Elective course VIII - Database applications Przedmiot wybieralny VIII - Aplikacje bazodanowe	30E	-	15	-	-	(5)	W-K
6.7	Elective course VI - Corporate IT systems Przedmiot wybieralny VI - Korporacyjne systemy informatyczne	15	-	15	-	-	(2)	W-K
	Elective course VI - Fundamentals of computerized management systems Przedmiot wybieralny VI - Podstawy zintegrowanych systemów zarządzania	15	-	15	-	-	(2)	W-K
6.8	Elective course VII - Data transmission in computer networks Przedmiot wybieralny VII - Transmisja danych w sieciach komputerowych	30	-	15	-	-	(4)	W-K
	Elective course VII - Internet teleinformation solutions Przedmiot wybieralny VII - Rozwiązania teleinformatyczne sieci Internet	30	-	15	-	-	(4)	W-K

6.9	Elective course X - Advanced topics in computer graphics Przedmiot wybieralny X - Zaawansowane zagadnienia grafiki komputerowej	**30**	**-**	**15**	**-**	**-**	**(2)**	W-K
	Elective course X - High level programming languages Przedmiot wybieralny X - Języki programowania wysokiego poziomu	**30**	**-**	**15**	**-**	**-**	**(2)**	W-K
	Elective course X - Human-machine interface Przedmiot wybieralny X - Interfejsy człowiek-maszyna	**30**	**-**	**15**	**-**	**-**	**(2)**	W-K
	Elective course X - Multimedia presentation techniques Przedmiot wybieralny X - Multimedialne techniki prezentacji	**30**	**-**	**15**	**-**	**-**	**(2)**	W-K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							**2**	
6.10	Foreign language Język obcy	**(E)**	**-**	**30**	**-**	**-**	**(2)**	W
	Foreign language Język obcy	**(E)**	**-**	**30**	**-**	**-**	**(2)**	W
Liczba godzin w semestrze (Number of hours in a semester)		**165**	**225**				**30**	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		**390**						

SEMESTR: 7 (7th Semester)		Liczba godzin zajęć w semestrze; E – egzamin Working time (hours) a semester; E – Exam					ECTS	TYP
Nr	Przedmiot Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
7.1	Modern technologies in computer science Nowoczesne technologie w informatyce	30	-	-	-	-	1	K
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							23	
7.2	Bachelor of Science thesis Praca dyplomowa inżynierska	godziny niekontaktowe (un-contact hours)					(15)	W-K
7.3	Elective course XII - Basics of programming industrial automation systems Przedmiot wybieralny XII - Podstawy programowania przemysłowych systemów automatyki	30	-	15	-	-	(2)	W-K
	Elective course XII - Computational engineering Przedmiot wybieralny XII - Inżynieria obliczeniowa	30	-	15	-	-	(2)	W-K
	Elective course XII - Perception systems for autonomous vehicles Przedmiot wybieralny XII - Systemy percepcji w pojazdach autonomicznych	30	-	15	-	-	(2)	W-K
	Elective course XII - Programming VI Przedmiot wybieralny XII - Programowanie VI	30	-	15	-	-	(2)	W-K
7.4	Elective course XI - Computer aided design II Przedmiot wybieralny XI - Komputerowe wspomaganie projektowania II	30	-	15	-	-	(2)	W-K
	Elective course XI - Computer networks III Przedmiot wybieralny XI - Sieci komputerowe III	30	-	15	-	-	(2)	W-K
	Elective course XI - Introduction to computer forensics Przedmiot wybieralny XI - Wprowadzenie do informatyki śledczej	30	-	15	-	-	(2)	W-K
	Elective course XI - Programming V Przedmiot wybieralny XI - Programowanie V	30	-	15	-	-	(2)	W-K

7.5	Elective course XIII - Basics of data mining Przedmiot wybieralny XIII - Podstawy eksploracji danych	30	-	15	-	-	(2)	W-K
	Elective course XIII - Image analysis and recognition Przedmiot wybieralny XIII - Analiza i przetwarzanie obrazu	30	-	15	-	-	(2)	W-K
	Elective course XIII - IT tools in engineering practice Przedmiot wybieralny XIII - Narzędzia informatyczne w praktyce inżynierskiej	30	-	15	-	-	(2)	W-K
	Elective course XIII - Signal processing in embedded systems Przedmiot wybieralny XIII - Przetwarzanie sygnałów w systemach wbudowanych	30	-	15	-	-	(2)	W-K
7.6	Bachelor of Science seminar Seminarium dyplomowe	-	-	-	-	30	(2)	W-K
Praktyka – wymagana liczba p. ECTS w semestrze (Practice – compulsory ECTS in a semester)							6	
7.7	Practical training - 4 weeks Praktyka zawodowa – 4 tygodnie	-	-	-	160	-	(6)	W-PR
Liczba godzin w semestrze (Number of hours in a semester)		120	235				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		355						

PLAN STUDIÓW RAZEM (TOTAL STUDY PLAN)		ECTS
Łącznie godzin kontaktowych/ECTS w planie studiów Total contact hours/ECTS in study plan	2650	210

STATYSTYKA PROGRAMU STUDIÓW			
Typ	**Przedmioty - p. ECTS razem**	**wg planu**	**udział**
HS	Humanistyczne lub społeczne	2	0.95 %
K	Kierunkowe	96	45.71 %
P	Podstawowe	34	16.19 %
W	Wybieralne	8	3.81 %
W-HS	Humanistyczne lub społeczne, wybieralne	5	2.38 %
W-K	Wybieralne kierunkowe	59	28.10 %
W-PR	Praktyki	6	2.86 %
	Łącznie:	210	100.00 %

Program studiów dostosowany do kierunkowych efektów uczenia się dla kierunku studiów COMPUTER ENGINEERING (studia pierwszego stopnia)
Plan i program studiów:
– uchwalony przez Senat PO
– zaopiniowany przez samorząd studencki.

Politechnika Opolska
Wydział Elektrotechniki, Automatyki i Informatyki
Opole 2024 r.

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First

Course Title	Algorithms and data structures
Nazwa przedmiotu	Algorytmy i struktury danych

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	K2	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	level 4 PRK
		2	
	Skills	1	level 4 PRK
		2	
	Social Competence	1	level 4 PRK
		2	

Course Goals Preparing Students for the design of algorithms for the application.

Programme content 1. Task algorithmic. Algorithm specification. Algorithm correctness (partial and total). Invariants. Methods of writing algorithms. 2. Memory and time complexity of algorithms. Asymptotic notation. 3. Basic techniques for building algorithms - Recursion. Algorithms from returns; - Divide and conquer; - Dynamic programming; - Greedy method. 4. Algorithms sorting and searching. 5. Dynamic data structures. List, stack, queue. 6. Trees and basic operations on them. Binary search trees. 7. Graphs. Representations, methods search, shortest paths.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has basic knowledge of implementation algorithmic issues.	K1_W06	W	A G I R
	2	A student has basic knowledge of data structures, knows and understands exploration and optimization methods graphs, as well as other algorithmic problems.	K1_W05	W	A G I R
	3	A student has basic knowledge of implementation algorithmic issues	K1_W06	C	G I J K
	4	A student has basic knowledge of data structures, knows and understands exploration and optimization methods graphs, as well as other algorithmic problems.	K1_W05	C	G I J K
Skills	1	A student can perceive metatechnical, system, social and ethical aspects of the proposed engineering tasks and their solutions in data structures.	K1_U09	C	G I R
	2				
Social Competence	1	A student understands the need for constant education and learning throughout life. He can do it in a creative way apply the acquired knowledge. He can conquer needed information and share knowledge with others.	K1_K01	W	A G I R
	2	A student understands the need for constant education and learning throughout life. He can do it in a creative way apply the acquired knowledge. He can conquer needed information and share knowledge with others.	K1_K01	C	E I J P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr hab. inż. Kawala-Sterniuk Aleksandra
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	20
Examination or final colloquium	2
Additional contact hours	0
Total student workload	127
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Second		
Course Title	Architecture of computers		
Nazwa przedmiotu	Architektura komputerów		
ECTS points	5	Subject type	K

Language of lecture	angielski	Mode of completing the course	Examination
Course code	K5	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge of number systems and their conversion conversions, logic and Boolean algebra.
		2	A student knows the basics of programming in high-level languages (e.g.: C/C++/C#).
	Skills	1	A student can convert values between different systems numerical, i.e.: binary, octal, decimal, hexadecimal.
		2	A student Is able to use programming techniques in languages high level (e.g.: C/C++/C#) to create simple ones application.
	Social Competence	1	A student is no need to possess any social competences.
		2	

Course Goals Student will be taught regarding construction and architecture of various types of modern computers including PCs and Macs.

Programme content Architecture x86 family processor and numerical coprocessor. Getting to know the structure of orders processor and co-processor. The role of the stack in passing arguments between functions, combining assembly language programs with other programming languages.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student knows the rules of writing fixed-point and floating-point variables.others necessary for solving engineering problems	K1_W06	W L	A G H
	2	A student has a basic knowledge of the structure and functioning of computer systems, knows the basic functions of individual components of a computer system. He knows the work cycle of a computer system.	K1_W01	W L	A G H
Skills	1	A student can use assembly language programming techniques to create simple applications in 16-bit processor mode (also with the use of coprocessor, interrupt system, etc.).	K1_U07	L	A G H
	2				
Social Competence	1	A student is understands the need to constantly expand knowledge.	K1_K01	W L	A G H
	2				

Methods of verification of learning outcomes: A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Kawala-Sterniuk Aleksandra
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	40
Independent study of the course topics	0
Examination or final colloquium	2
Additional contact hours	0
Total student workload	132
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering

Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Artificial intelligence tools
Nazwa przedmiotu	Narzędzia sztucznej inteligencji

ECTS points	4	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	K20	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge of algorithm analysis
		2	
	Skills	1	A student is able to describe of the algorithm in the form of a block diagram
		2	
	Social Competence	1	A student understands the need for self-improvement.
		2	

Course Goals Introducing students to practical knowledge in the field of selected methods of artificial intelligence. The course will present the currently used machine learning techniques, algorithms and tools

Programme content Lecture in an auditorium or online form. Basic concepts, definitions and tools in the field of artificial intelligence, data engineering and data science.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student knows the basic concepts of machine learning and the selected methods and tools	K1_W10	W	C
	2	A student understands the position and importance of artificial intelligence. He knows areas of its application.	K1_W05	W	C
Skills	1	A student has basic knowledge of at least one dedicated computing tool for solving problems in the field of machine learning	K1_U15	P	K L
	2				
Social Competence	1	A student can propose machine learning solutions that can resolve simple engineering problems	K1_K01	P	K L
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Tomaszewski Michał
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	30	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	20

Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Bachelor of Science thesis
Nazwa przedmiotu	Praca dyplomowa inżynierska

ECTS points	15	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	OWPDI	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Student has a structured, general knowledge of selected problems in the studied field of study, including general, technical specialised subjects.
		2	
	Skills	1	Student can use technical and scientific-engineering tools and techniques to solve IT problems.
		2	
	Social Competence	1	The student is able to properly define priorities for solving tasks.
		2	The student understands the need for continuous deepening of knowledge.

Course Goals	Preparation of the diploma thesis.

Programme content Depending on the engineering thesis topic, the student independently broadens his knowledge and skills in computer science. Prepares work according to the rules for preparing scientific and diploma theses in the field of technical sciences.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has a general knowledge in the engineering disciplines associated with the computer science.	K1_W05	P	K O
	2				
Skills	1	The student can carry an analysis of the subject matter of the engineering diploma thesis, as well as search for appropriate literature and analyzed them	K1_U06	P	K O
	2	The student can analyze and evaluate the correctness of the proposed solutions	K1_U07	P	K O
	3	The student is able to notice non-technical aspects during completion of the diploma thesis.	K1_U03	P	K O
	4	The student is able to plan and implement independently individual stages of your work.	K1_U05	P	K O
Social Competence	1	The student can critically assess his knowledge	K1_K01	P	K O
	2	The student is able to work with respect for ethical principles professional.	K1_K04	P	K O

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	dr hab. inż. Rydel Marek
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0

Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	0
Preparation of a report/paper/ project/presentation	50
Independent study of the course topics	325
Examination or final colloquium	0
Additional contact hours	0
Total student workload	375
Number of contact hours (from the study plan)	0

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Bachelor of Science seminar
Nazwa przedmiotu	Seminarium dyplomowe

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	OWSD	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Knowledge of the subject of the diploma thesis
		2	
	Skills	1	Using a program to make a computer presentation
		2	
	Social Competence	1	A student can communicating in a selected environment
		2	

Course Goals Preparation of the thesis under the supervision of the supervisor

Programme content

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has in-depth knowledge of the field of study	K1_W05	S	N O
	2				
Skills	1	A student can properly search for information on engineering problems	K1_U06	S	N O
	2	A student can use professional engineering terminology	K1_U08	S	N O
	3	A student can use computer presentation tools	K1_U14	S	N O
Social Competence	1	A student can independently make decisions about the scope of his work	K1_K01	S	N O
	2	A student has maintains the principles of professional ethics	K1_K04	S	N O

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	dr hab. inż. Rząsa Mariusz
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	30	

Student workload

Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0
Seminar (S)	30
Preparation for classes	10
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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dr inż. Zygarlicka Małgorzata
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Basics of artificial intelligence
Nazwa przedmiotu	Podstawy sztucznej inteligencji

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	K17	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student has knowledge of mathematics, including: basics of analysis mathematics, matrix algebra, set theory and logic mathematics.
		2	Student knows selected high-level programming languages.
	Skills	1	Student can use the mathematical methods he has learned, including: for examination course of variability and determining the extremes of functions and execution basic matrix operations and logic tasks mathematics.
		2	Student can program in selected programming languages, both in based on procedural and object-oriented methodology.
	Social Competence	1	Student can work in a group.
		2	

Course Goals The aim of the course is to gain knowledge and skills in the use of artificial intelligence in IT applications.

Programme content The subject provides knowledge on issues related to the applications of artificial intelligence. During the module, the student acquires knowledge and skills in the field of artificial intelligence, the history of AI, neural networks, machine and deep learning, fuzzy logic, linguistic variables and fuzzy relations, reasoning in fuzzy logic, in systems with knowledge bases; defuzzification of knowledge, expert systems, genetic algorithms and other AI algorithms.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has basic knowledge of the construction, operation and application of artificial neural networks and fuzzy logic systems.	K1_W10	W L	A H
	2	A student has basic knowledge of artificial intelligence methods and tools and areas of application.	K1_W10	W	A
Skills	1	A student can select and design an appropriate fuzzy system to solve a specific task.	K1_U15	L	E H
	2	A student can build and perform a learning and simulation process for artificial neural networks.	K1_U15	L	E H
	3	A student can make an application using a genetic algorithm to solve a specific problem.	K1_U15	L	E H
Social Competence	1	A student is aware of the responsibility for his own work and follow the rules of working in the team group,	K1_K01	L	P
	2	A student understands the impact of his activities on society and technology development.	K1_K02	W	P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Bryniarska Anna
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	33
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third

Course Title	Computer aided design I
Nazwa przedmiotu	Komputerowe wspomaganie projektowania I

ECTS points	3	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	K7	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	in accordance with the recommendations of PRK lvl 4
		2	
	Skills	1	in accordance with the recommendations of PRK lvl 4
		2	
	Social Competence	1	in accordance with the recommendations of PRK lvl 4
		2	

Course Goals envirnoment: Introducing to the principles of creating a technical drawing in CAD

Programme content: Fundamentals of Construction Notation Creating Technical Drawings - Drawing and Editing Flat Shapes Presentation and Publication of Technical Documentation

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows the role of CAD software in creating technical documentation	K1_W09	W L	C
	2				
Skills	1	The student can make a technical drawing in the CAD environment in accordance with applicable standards	K1_U08	L	I
	2				
Social Competence	1	The student is able to define and plan particular stages of technical drawing developement	K1_K01	L	C
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Dzierżanowski Łukasz
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	5
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth

Course Title	Computer graphics I		
Nazwa przedmiotu	Grafika komputerowa I		
ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination
Course code	K15	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge of computer science.
		2	
	Skills	1	A student is ability to operate a computer and program in a chosen programming language.
		2	
	Social Competence	1	A student can interact and work in a group.
		2	

Course Goals The aim of the course is to learn the basic issues in the field of computer graphics. During the laboratory classes, students learn the basic methods of creating vector and 3D graphics, and methods for processing bitmap graphics

Programme content Lecture in the auditorium. Presentation of selected algorithms and techniques suitable for various aspects of computer graphics. Practical implementation of graphic designs in selected tools.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of the algorithms used in computer graphics.	K1_W05	W	A J K
	2	A student knows the basic techniques of working with vector graphics, with bitmap graphics.	K1_W09	W	A J K
Skills	1	A student can use a dedicated program to handle vector graphics, raster or three-dimensional graphics.	K1_U07	L	K M
	2	A student can choose the right tool for the specific problems in the field of computer graphics.	K1_U14	L	K M
Social Competence	1	A student understands the need for continuous training.	K1_K01	W L	P R
	2	A student is aware of responsibility for their own work and readiness to comply with the rules of teamwork and responsibility for jointly performed tasks.	K1_K02	L	P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	20
Examination or final colloquium	2
Additional contact hours	0
Total student workload	127
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third

Course Title	Computer networks I
Nazwa przedmiotu	Sieci komputerowe I

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	K8	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student should have basic computer network knowledge.
		2	
	Skills	1	Student should have basic skills in computer network design.
		2	
	Social Competence	1	Ability to work in a group.
		2	

Course Goals To acquaint students with the technology existing in computer networks.

Programme content Programmed content that will ensure learning outcomes for the subject are issues in the area of broadly understood computer networks. The course will also focus on presenting information on the OSI and TCP/IP models.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in the computer networks area.	K1_W07	W L	C H P R
	2	A student has knowledge in the operating systems area.	K1_W07	W L	C H P R
Skills	1	A student can design, according to a given specification, perform computer networks with appropriate methods and techniques.	K1_U11	L	H P R
	2	A student can maintain computer networks with appropriate methods and techniques.	K1_U11	L	H P R
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W L	C H P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	25

Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	40
Examination or final colloquium	0
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth
Course Title	Computer networks II
Nazwa przedmiotu	Sieci komputerowe II

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	K16	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student should have basic knowledge of computer networks.
		2	A student should have basic knowledge of OSI and TCP/IP model.
	Skills	1	A Student should have skills in computer network design.
		2	A Student should have skills in configuration computer network protocols.
	Social Competence	1	A Student is ability to work in a group.
		2	

Course Goals To acquaint students with advanced technologies existing in computer networks.

Programme content The programmed content that will ensure the learning outcomes for the subject include advanced issues in the field of broadly understood computer networks. The course will also focus on providing information about network protocols, including routing protocols.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has specialized knowledge in the computer networks and operating systems area.	K1_W07	W L	A H P
	2	A student has specialized knowledge in the computer networks protocols.	K1_W07	W L	A H P
Skills	1	A student can design, according to a given specification, perform and maintain computer networks with appropriate methods and techniques.	K1_U11	L	H P
	2				
Social Competence	1	A student can make decisions also in difficult situations.	K1_K01	L	H P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	45
Examination or final colloquium	2
Additional contact hours	0
Total student workload	132
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	First		
Course Title	Copyright and economy law		
Nazwa przedmiotu	Prawo autorskie i gospodarcze		
ECTS points	2	Subject type	HS

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	P6	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	In aacordance with PRK level 4
		2	
	Skills	1	In aacordance with PRK level 4
		2	
	Social Competence	1	In aacordance with PRK level 4
		2	

Course Goals The course objectives are to introduce, student, to the basic concepts on the field of copyright and it evolution, use and distribution of creative and expressive work (regulation) on local and global scales.

Programme content The course includes an introduction to the basic concepts on the field of copyright and it evolution, use and distribution of creative and axpressive work . Then a presentation of the legal framework (national and international) with a view on the process of harmonization of copyright regulation.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has knowledge of the functions and rules of commercial law and entrepreneurship principles	K1_W02	W	C
	2	The student is able to identify problems related to the use of works in business	K1_W02	W	C
Skills	1				
	2				
Social Competence	1	The student validate his knowledge and the range of problems solved during classes	K1_K01	W	C
	2	The student chooses the legal solutions appropriate to achieve the intended economic goal	K1_K03	W	C

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr Edaich Said
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Database basics

Nazwa przedmiotu	Podstawy baz danych		
ECTS points	4	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	K4	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student has basic knowledge of programming languages
		2	Student knows data structures and basic mathematical algorithms
	Skills	1	Student is able to obtain information from literature and other sources
		2	Student is able to analyze problems, organize and verify information, test the results obtained
	Social Competence	1	Student understands the need for self-education.
		2	

Course Goals Providing knowledge and enabling the acquisition of skills in the field of database basics and SQL.

Programme content The subject provides knowledge on issues related to the basics of databases and the SQL language. During the module, the student acquires knowledge and skills in the field of database terminology, history, types of databases, data types and basic SQL commands, building a database server, permissions management, entity relationship models, relational data model, database normalization, database security, and current trends in creating databases.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student knows and understand basic information on databases and the basics of the SQL language.	K1_W08	W L	C F
	2				
Skills	1	Student can create basic database commands using the SQL language.	K1_U13	L	F
	2				
Social Competence	1	Students become aware of the need to maintain quality in the databases they create.	K1_K01	W L	P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Bryniarska Anna
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	25
Examination or final colloquium	0
Additional contact hours	0
Total student workload	105
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third

Course Title	Database modelling
Nazwa przedmiotu	Modelowanie baz danych

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	K9	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student should have basic knowledge of Sql language and database design.
		2	
	Skills	1	A student should have basic skills in the field of RDBMS support.
		2	
	Social Competence	1	A student is ability to cooperate in a group.
		2	

Course Goals Preparing students for managing database management systems.

Programme content Programmed content that will ensure learning outcomes for the subject are issues from the broadly understood area of database modeling. The course will also focus on presenting information on the design of relational and object-oriented databases and the practical use of SQL and OQL.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in replication in data bases.	K1_W08	W L	A H P R
	2	A student has knowledge in indexes in data bases.	K1_W08	W L	A H P
	3	A student has knowledge in data base modeling.	K1_W08	W L	A H P R
Skills	1	A student can design, according to a given specification, perform and maintain data bases with appropriate methods and techniques.	K1_U13	L	H R
	2				
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W L	A H P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	33
Preparation of a report/paper/ project/presentation	0

Independent study of the course topics	30
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth

Course Title	Discrete mathematics
Nazwa przedmiotu	Matematyka dyskretna

ECTS points	2	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P12	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Knowledge of basic concepts of linear algebra, incl matrix calculus.
		2	Knowledge of the concept of function and sequence.
	Skills	1	Ability to perform basic calculations algebra, including matrix calculus.
		2	Accounting efficiency, operations on real numbers, complex and algebraic expressions
		3	Determining the limit of a sequence and a function, calculating the derivative functions, determining the primitive function.
	Social Competence	1	Student is able to work independently and as a team member.
		2	The desire to explore the world and pursue practical pursuits application of acquired knowledge.

Course Goals Improvement of mathematical reasoning and understanding.

Programme content Within The subject provides knowledge on issues related to number arithmetic natural, mathematical induction and recursion. The student learns to solve some recursive equations, learns number theory, solves problems related to congruencies. The student learns to use combinatorial methods to solve various problems such as also methods for calculating finite sums. The student learns concepts and methods from graph theory.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows the basic techniques of proving, in particular proof by mathematical induction.	K1_W01	W	C
	2	The student knows the basic recursive equations, in particular the Fibonacci equation; knows the basic techniques of solving recursive equations.	K1_W01	W	C
	3	The student knows the basic techniques of counting combinatorial objects, including the Dirichlet and box principle the principle of inclusion-exclusion.	K1_W01	W	C
	4	The student knows the basic concepts of differential calculus and the methods of finite sums determination.	K1_W01	W	C
Skills	1	The student uses mathematical induction to prove a simple dependence.	K1_U01	C	C F
	2	Student uses various methods to solve linear recursive equations.	K1_U01	C	C F
	3	Student uses various combinatorial methods to calculate the number of elements of a certain set, meet certain criteria.	K1_U01	C	C F
	4	The student uses the calculus of difference to calculate simple finite sums.	K1_U01	C	C F
Social Competence	1	The student acquires the habits of being systematic, organizing knowledge, searching for an appropriate solution to the problem.	K1_K03	W C	C E P
	2	The student is able to analyze, draw conclusions, argue, critically evaluate solutions.	K1_K03	W C	C E P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Kawala-Sterniuk Aleksandra
Calculation class (C)	15	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	15
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	10
Examination or final colloquium	2
Additional contact hours	0
Total student workload	52
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course I - Good software development practices
Nazwa przedmiotu	Przedmiot wybieralny I - Dobre praktyki wytwarzania oprogramowania

ECTS points	5	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	KW1	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has knowledge about the life cycle of the software and understands the goals software engineering.
		2	The student has a basic knowledge of design and programming objectoriented (Java, C # or C ++).
		3	The student knows the ways of building software produced by teams.
	Skills	1	S/he is able to obtain information from the literature in the field of programming, solving programming problems and simple testing.
		2	A student is able to implement the project and build an IT system and solve problems encountered in the implementation of IT systems. He can test the IT system and determine the quality of its operation.
	Social Competence	1	The student is able to obtain knowledge from various sources and is aware of the need for continuous education.
		2	

Course Goals Preparing students to work in teams producing software of good quality, using the latest trends and approaches.

Programme content Informative lecture, problem lecture, description, instruction, seminar lecture and didactic discussion, situational method, activities, workshop method. the curse goal is preparing students to work in teams producing software of good quality, using the latest trends and approaches.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in the field of good manufacturing practices software in various technologies.	K1_W06	W	A E P R
	2	A student has knowledge about selected patterns design used in manufacturing software.	K1_W06	W	A E P
	3	A student has knowledge about dedicated design patterns for data mapping.	K1_W06	W	A E R
Skills	1	A student can choose technology and methodologies software development for the task being performed.	K1_U03	W L	E I K L O R
	2	A student can program in accordance with the principles of good software development.	K1_U07	L	E I K P R
	3	A student can choose and apply design patterns well in the chosen programming technology.	K1_U10	L	E I K L M P R
Social Competence	1	A student can make decisions about choosing good methodologies software development and design patterns, adapting them to the reality of work with consciousness the impact of your decisions on the work of third parties.	K1_K01	W L	E P R
	2	A student can work in accordance with the principles of professional ethics.	K1_K04	W L	E P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Zatwarnicka Anna
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0

Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	28
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course I - Testing applications and systems
Nazwa przedmiotu	Przedmiot wybieralny I - Testowanie aplikacji i systemów

ECTS points	5	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	KW1	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student has knowledge about the life cycle of the software. He knows and understands the goals software engineering.
		2	Knowledge of basic problems of design and programming object.
		3	Knowledge of object programming languages (Java, C # or C ++).
		4	Knowledge of the UML object modeling language.
	Skills	1	Student is able to obtain information from the literature in the field of computer science, also in foreign language. He can integrate the obtained information, make it interpretation, as well as draw conclusions and formulate and justify opinions
		2	Student is able to implement the project and build an IT system and solve problems encountered in the implementation of systems information. Student can test the IT system and determine the quality of its operation.
		3	Has the ability to self-education, including for improving professional competences.
		4	Student can think in a creative way when solving technical tasks and issues.
	Social Competence	1	Student can think and act in a creative and enterprising way.
		2	Student can interact and work in a group.

Course Goals To familiarize students with the methodologies and tools for testing information systems.

Programme content Informative lecture, problem lecture, description, instruction, conversational lecture and discussion, if possible didactic method, situational method, cases, workshop method. The course is to familiarize students with the methodologies and tools for testing information systems.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has knowledge in the field of application testing and information systems. He knows the types of tests and testing methodology.	K1_W06	W	A P R
	2	Student knows the rules of building unit tests and knows how to choose tests for the type of IT system.	K1_W06	W	A P
	3	Student knows the rules of work and labor costs of working teams according to the Test Driven Development methodology.	K1_W06	W	A R
Skills	1	Student can choose the right system tests information depending on the complexity of the problems and the type of system. He can develop scenarios testing.	K1_U03	L	E I K L R
	2	Student can perform unit tests in the selected one programming technology, including work user and current trends in development applications and information systems.	K1_U07	L	E I K P R
	3	Student is able to work using the Test Driven Development method the scope of the chosen programming technology.	K1_U10	L	E I K L M P R
Social Competence	1	Student is aware of the responsibility for his own work and team.	K1_K01	W L	E P R
	2	Student knows and adheres to ethical standards when working under a team working on software development.	K1_K04	W L	E P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Zatwarnicka Anna
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload

Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	28
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course II - Designing internet solutions
Nazwa przedmiotu	Przedmiot wybieralny II - Projektowanie rozwiązań internetowych

ECTS points	3	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW2	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Solid knowledge on the web page development
		2	
	Skills	1	Simple web applications development
		2	Gaining the subject information from books and Internet
	Social Competence	1	Teamworking
		2	

Course Goals Teaching how to design and implement an internet solutions.

Programme content Lecture in an auditorium hall or on-line version. Providing knowledge and skills in engineering disciplines related to IT in the field of designing Internet solutions.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student knows the sorts of internet applications and their importance	K1_W05	W P	C
	2				
Skills	1	Student can design a functional internet application for e-commerce	K1_U03	P	K M O
	2	Student can make graphic elements for the correct reception of a web application using universal design principles	K1_U09	P	K M O
Social Competence	1	Studen can define and assign tasks needed to design an internet solution in a team	K1_K01	P	K M O
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Tomaszewski Michał
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

Student workload

Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	20
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course II - Embedded systems
Nazwa przedmiotu	Przedmiot wybieralny II - Systemy wbudowane

ECTS points	3	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW2	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student has structured knowledge in the field of C/C++ and assembler programming languages/techniques
		2	A student has a structured knowledge of computer architecture, calculating the representation of integer and real numbers and performing basic arithmetical and logical operations on these representations
	Skills	1	A student can acquire information from literature, the Internet and other sources, can integrate the acquired information and draw conclusions
		2	
	Social Competence	1	A student can work in a team, taking on different roles
		2	

Course Goals The aim of the course is to acquire basic knowledge and skills in the design and implementation of embedded systems, both in the context of documentation as well as hardware and software

Programme content The subject provides knowledge in the design and application of embedded systems

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowledge in the engineering disciplines associated with the computer science.	K1_W05	W	C
	2	A student has a basic knowledge of signal processing terminology and system analysis.	K1_W01	W P	C J
Skills	1	A student can obtain information from literature and other sources, integrate the obtained information and interpret it.	K1_U06	P	C I J
	2	A student can use the signal processor and its peripherals by programming simple embedded systems.	K1_U09	P	I
Social Competence	1	A student is aware of the importance and understands the non-technical aspects and consequences of engineering activity, including its impact on the environment, and the related responsibility for the decisions made.	K1_K04	W P	C K L M N O P
	2	A student can interact and work in a group. He is able to define priorities for the realization of a task set by himself or others.	K1_K01	W P	I J

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Podpora Michał
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course III - Computer graphics II			
Nazwa przedmiotu	Przedmiot wybieralny III - Grafika komputerowa II			
ECTS points	4	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	KW3	Subject related to scientific research/pract. profess. prepar. (Y/N)		T

Preliminary requirements of the course	Knowledge	1	A student has knowledge from the lecture Computer Graphics I
		2	
	Skills	1	A student has computer skills and programming proficiency
		2	
	Social Competence	1	A student can cooperate and work in a group
		2	

Course Goals The aim of the course is to get acquainted with advanced computer graphics issues with particular focus on 3D graphics

Programme content Lecture in the auditorium, Presentation of basic and advanced three-dimensional graphics algorithms. Creating spatial objects, visual effects, animation elements

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has an orderly, theoretically founded knowledge covering issues of generating and editing vector, bitmap and three-dimensional graphics	K1_W09	W P	C E K M P R
	2	A student knows the rules of constructing interactive applications graphic	K1_W09	W P	C E K M P R
	3	A student up-to-date knowledge on the latest achievements in the field of computer graphics	K1_W09	W	C
Skills	1	A student can develop extensive scene models three-dimensional and enrich them with the so-called special effects	K1_U14	P	E K M P R
	2	A student the preparation necessary for programming three-dimensional graphic applications with the use of programming library	K1_U14	P	E K M P R
	3	A student prepare a well-documented study of the computer graphics problems	K1_U14	P	E K M P R
Social Competence	1	A student properly define priorities for implementation tasks specified by oneself or others	K1_K01	P	K P R
	2	A student interact and work in a group, accepting in it different roles	K1_K01	P	K P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0

Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course III - Vision systems
Nazwa przedmiotu	Przedmiot wybieralny III - Systemy wizyjne

ECTS points	4	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW3	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of computer science.
		2	
	Skills	1	Programming skills in one of the programming languages.
		2	
	Social Competence	1	Student can interact and work in a group.
		2	

Course Goals Familiarize students with the algorithms used in visions systems.

Programme content Lecture in the auditorium. During the classes, knowledge about modern vision systems is provided based on the extensive use of the OpenCV library

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has detailed knowledge of practical ways to use the vision system	K1_W05	W P	C L
	2	Student has practical knowledge about algorithms used in applications intended for bitmap processing	K1_W06	W P	C L
	3	Student has knowledge in the field of computer graphics.	K1_W09	W P	C L
Skills	1	Student can propose the right solution of the vision system depending on the needs	K1_U09	P	J K P R
	2	Student can prepare a procedure that allows to carry out an unusual algorithm that processes a digital image	K1_U10	P	J K P R
	3	Student can program appropriate procedures to automation of activities related to the processing of digital images	K1_U14	P	J K
Social Competence	1	Student understands the need for continuous training	K1_K01	W P	P R
	2	Student is aware of the responsibility for his own work and readiness to comply with the principles of teamwork and taking responsibility for the tasks he or she has carried out jointly	K1_K04	P	P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	15
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Tomczewski Krzysztof
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth
Course Title	Elective course IV - Administration of network operating systems
Nazwa przedmiotu	Przedmiot wybieralny IV - Administracja sieciowymi systemami operacyjnymi

ECTS points	4	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	KW4	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Knowledge in the field of computer networks and operating systems.
		2	
	Skills	1	Skills in the field of computer networks and Operating Systems.
		2	
	Social Competence	1	Group working skills.
		2	

Course Goals Introducing students to the implementation and maintenance of network operating systems in enterprise environment.

Programme content The subject provides knowledge on the functioning of network systems operational conditions in the enterprise. Issues related to are presented implementation and maintenance of network operating systems with a directory service.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in the computer networks and operating systems area.	K1_W07	W L	C
	2				
Skills	1	A student can install, configure and administer operating systems, with the use of appropriate methods and techniques	K1_U11	L	C
	2	A student can maintain and diagnose the operation of network operating systems.	K1_U12	L	C
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W L	P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Gola Mariusz
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	30
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth
Course Title	Elective course IV - System programming

Nazwa przedmiotu	Przedmiot wybieralny IV - Programowanie systemowe		
ECTS points	4	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	KW4	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student knows the role of the operating system in a computer system
		2	2 A student knows the difference between compiled programs, script and other files
	Skills	1	A student can program in a selected programming language
		2	A student can run programs from the command line and move in the directory structure
	Social Competence	1	A student can independently acquire the knowledge and skills needed to perform a specific task
		2	

Course Goals Preparing students for programming using operating system mechanisms, i.e. file and directory operations, communication mechanisms and interprocess synchronization

Programme content Linux programing. Files, directories and device files on Linux

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of the operation of operating system mechanisms.	K1_W07	W L	C H
	2				
Skills	1	A student can use the knowledge of the operating system mechanisms during programming.	K1_U12	L	C H
	2				
Social Competence	1	A student can learn, draw conclusions, make decisions.	K1_K01	W L	C H
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Pokuta Waldemar
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	25
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Elective course IX - Data protection in applications

Nazwa przedmiotu	Przedmiot wybieralny IX - Ochrona danych w aplikacjach		
ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	KW9	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of the operation and functioning of applications and computer systems
		2	
	Skills	1	Creating and configuring applications
		2	
	Social Competence	1	The student can cooperate in a group
		2	The student can acquire knowledge from sources

Course Goals Theoretical and practical implementation of students in issues related to data protection to the extent necessary for system and computer network administrators

Programme content Basic concepts and methods of data protection. Risk management. Security policy. Application security mechanisms. Symmetric and asymmetric cryptographic systems. Message authentication, digital signatures. Public key infrastructure. Cryptographic protocols. Application security testing.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of the protection and security of personal data in ICT systems.	K1_W07	W P	C H P R
	2	A student has knowledge in the field of designing software / systems ensuring the security of stored and transmitted data	K1_W06	W P	C H P R
Skills	1	A student can both independently and as a team carry out the tasks of designing and implementing secure IT systems, as well as analyze and test them and draw conclusions.	K1_U07	P	C H P R
	2	A student has able to search and use the provisions of legal acts concerning data security and personal data security and other sources of engineering knowledge and to apply the found knowledge in the creation of IT systems.	K1_U09	P	C H P R
Social Competence	1	A student can critically evaluate his knowledge and the range of issues he knows, and he can independently look for solutions and make decisions.	K1_K01	W P	C H P R
	2	Is aware of the impact of application security on the social environment and public interest.	K1_K02	W P	C H P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Rząsa Mariusz
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0

Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course IX - Data protection in systems and computer networks
Nazwa przedmiotu	Przedmiot wybieralny IX - Ochrona danych w systemach i sieciach komputerowych

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW9	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of the operation and functioning of applications and computer systems
		2	
	Skills	1	Creating and configuring network applications
		2	
	Social Competence	1	A student can cooperate in a group
		2	A student can acquire knowledge from sources

Course Goals Theoretical and practical implementation of students in issues related to data protection to the extent necessary for system and computer network administrators

Programme content Discussion of data protection issues relevant to system and computer network administrators.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of the protection and security of personal data in ICT systems.	K1_W07	W P	C H P R
	2	A student has knowledge in the field of designing software / systems ensuring the security of stored and transmitted data	K1_W06	W P	C H P R
Skills	1	A student can both independently and as a team carry out the tasks of designing and implementing secure IT systems, as well as analyze and test them and draw conclusions.	K1_U07	P	C H P R
	2	A student can able to search and use the provisions of legal acts concerning data security and personal data security and other sources of engineering knowledge and to apply the found knowledge in the creation of IT systems.	K1_U09	P	C H P R
Social Competence	1	A student can critically evaluate his knowledge and the range of issues he knows, and he can independently look for solutions and make decisions.	K1_K01	W P	C H P R
	2	Is aware of the impact of application security on the social environment and public interest.	K1_K02	W P	C H P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Rząsa Mariusz
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth
Course Title	Elective course V - Fundamentals of control engineering

Nazwa przedmiotu	Przedmiot wybieralny V - Podstawy automatyki		
ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	KW5	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student is knowledge in mathematical analysis including the differential and integral calculus and complex numbers, necessary to solve problems related with methods for description of dynamical elements and systems.
		2	
	Skills	1	A student has skills in application of mathematical analysis knowledge and methods related with the differential and integral calculus and complex numbers.
		2	
	Social Competence	1	A student has kills in proper determination of priorities serving to solve the social tasks.
		2	A student is understanding of the need for permanent deepening of knowledge.

Course Goals Students learn the basics of automation and control theory.

Programme content The programmed content that will ensure the learning outcomes for the subject are basic issues in the field of broadly understood automation and systems theory. The course will also focus on presenting information about controllers used in automation and the theory of controlling virtual objects using brain-computer interface technology.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowledge in the control systems	K1_W05	W L	C H P
	2				
Skills	1	A student can utilize knowledge in the control systems.	K1_U07	L	H P
	2				
Social Competence	1	A student is able to work in a team.	K1_K01	L	H P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth

Course Title	Elective course V - Fundamentals of systems theory
Nazwa przedmiotu	Przedmiot wybieralny V - Podstawy teorii systemów

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW5	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student is knowledge in mathematical analysis including the differential and integral calculus and complex numbers, necessary to solve problems related with methods for description of dynamical elements and systems.
		2	
	Skills	1	A student has skills in application of mathematical analysis knowledge and methods related with the differential and integral calculus and complex numbers.
		2	
	Social Competence	1	A student has skills in proper determination of priorities serving to solve the social tasks.
		2	A student is understanding of the need for permanent deepening of knowledge.

Course Goals Students learn the basics of automation and control theory.

Programme content The programmed content that will ensure the learning outcomes for the subject are basic issues in the field of broadly understood systems theory. The course will also focus on presenting information on the analysis and mathematical modeling of objects and processes of various nature, as well as the theory of controlling virtual objects using brain-computer interface technology.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowledge in the systems theory	K1_W05	W L	C H P
	2				
Skills	1	A student can utilize knowledge in the systems theory.	K1_U07	L	H P
	2				
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	H P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	0

Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course VI - Corporate IT systems
Nazwa przedmiotu	Przedmiot wybieralny VI - Korporacyjne systemy informatyczne

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW6	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student understands the needs of using computerized management systems in the companies.
		2	
	Skills	1	A student can use computer system to data acquisition.
		2	
	Social Competence	1	A student can co-operate in the group of people.
		2	

Course Goals Preparation students to using computerized management systems.
Programme content Lectures covering the issues of corporate information systems, particularly their analysis, design, implementation, and deployment. Laboratory exercises utilizing ERP software.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowedge in programming and software engineering. Student understands basic processes in the computer systems' life cycle.	K1_W06	W L	C E H I P R
	2	A student is familiar with basic concepts in economics, business law, and principles of running a business.	K1_W02	W L	C H I
Skills	1	A student can practicaly use his knowledge of the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations and perform economical evaluation of proposed engineering solutions.	K1_U02	L	C E H I P R
	2	A student can, in the process of formulating and solving engineering tasks, recognize non-technical, systemic, social, and ethical aspects.	K1_U03	L	C E H I P R
	3	A student can properly select sources of information and utilize advanced information and communication techniques (ICT) for this purpose. He can critically evaluate and synthesize information from various sources.	K1_U06	L	C E H I P R
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	C E H I P R
	2	A student can think and act entrepreneurially.	K1_K03	L	C E H I P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Radziewicz Wojciech
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload

Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course VI - Fundamentals of computerized management systems
Nazwa przedmiotu	Przedmiot wybieralny VI - Podstawy zintegrowanych systemów zarządzania

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW6	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student understands the needs of using computerized management systems in the companies.
		2	
	Skills	1	A student can use computer system to data acquisition.
		2	
	Social Competence	1	A student can co-operate in a group of people.
		2	A student can provide explanations as appropriate for defining a party strategy for himself or other assignments.

Course Goals Preparation of students to using computerized management systems.

Programme content Lectures covering the issues of integrated information systems for enterprises, particularly their evolution, structure, and security. Laboratory exercises utilizing ERP software.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student knows basic topics in the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations.	K1_W02	W L	C H I
	2	A student has knowledge in data bases area.	K1_W08	W L	C H I
Skills	1	A student can practicaly use his knowledge of the area work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations and perform economical evaluation of proposed engineering solutions.	K1_U02	L	C H I
	2	A student can perceive metatechnical, system, social and ethical aspects of the proposed engineering tasks and their solutions.	K1_U03	L	C H I
	3	A student can appropriately select sources of information and utilize advanced information and communication techniques (ICT) for this purpose. He is capable of critically evaluating and synthesizing information from various sources.	K1_U06	L	C H I
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	I J P
	2	A student can think and act entrepreneurially.	K1_K03	L	I J P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Radziewicz Wojciech
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course VII - Data transmission in computer networks			
Nazwa przedmiotu	Przedmiot wybieralny VII - Transmisja danych w sieciach komputerowych			
ECTS points	4	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	KW7	Subject related to scientific research/pract. profess. prepar. (Y/N)		T

Preliminary requirements of the course	Knowledge	1	A student has knowledge about information technology and operating systems.
		2	A student has an initial knowledge about computer networks and Internet construction.
	Skills	1	A student can acquire information in literature, databases and other sources.
		2	A student is able to integrate the obtained information, interpret them, and also draw conclusions and formulate and justify opinions.
	Social Competence	1	A student can interact and work in a group.
		2	

Course Goals To obtaining the elementary knowledge in the field of data transmission and devices included in data transmission links, including wireless systems, configuration of these devices in local networks. Student need to obtain the ability to choose and design an appropriate structure of data connections system to solve the task of connecting two computer devices or LANs.

Programme content The lesson provides knowledge on issues related to the basic concepts of digital data transmission at the physical layer level, properties of transmission media, i.e. copper, fiber optic and wireless media, data modulation, coding techniques, and improving transmission reliability through the use of correction codes. During the module, the student acquires skills in the operation of measuring instruments and applications enabling the diagnosis of data transmission systems and the assessment of their transmission and quality parameters. The acquired competences allow for a systemic approach to data transmission systems in terms of maintaining and ensuring quality and the required reliability, as well as raising awareness of responsibility for their proper operation.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has the knowledge of data transmission in computer networks and the properties of the transmission media, a specially radio and fiber optic.	K1_W07	W L	C F H
	2				
Skills	1	The student is able to independently and in a team carry out engineering tasks and perform basic research, interpret their results and draw conclusions in the field of data transmission in radio and fiber-optic computer networks.	K1_U07	L	F H
	2				
Social Competence	1	The student can act in accordance with the principles of ethics and respect the professional tradition of the workers involved data transmission systems. It promotes culture pro-quality and appropriate patterns of conduct in the professional environment of employees dealing with data transmission systems.	K1_K04	W L	C F H R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Kopka Ryszard
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0

Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course VII - Internet teleinformation solutions
Nazwa przedmiotu	Przedmiot wybieralny VII - Rozwiązania teleinformatyczne sieci Internet

ECTS points	4	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW7	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student has knowledge about data transmission and computer networks.
		2	
	Skills	1	Student can acquire information from literature, databases and other sources; can integrate the obtained information, make their interpretation, as well as draw conclusions and formulate and justify opinions.
		2	
	Social Competence	1	Student can interact and work in a team.
		2	

Course Goals Preparing students to use modern teleinformation techniques. To familiarize students with the technical structure of ICT networks and the Internet.

Programme content The lesson provides knowledge on issues related to the basic concepts of data transmission in ICT networks at the physical layer level, modulation and coding techniques, and improving transmission reliability through the use of correction codes. The issues of switching in such networks, bandwidth multiplication techniques used in various fields and transmission protocols used in the lower layers of the OSI model are discussed. As part of the module, the student acquires skills in the use of measuring instruments and applications enabling the diagnosis of ICT systems and the assessment of their transmission and quality parameters. The acquired competences allow for a systemic approach to ICT systems in terms of maintaining and ensuring quality and the required reliability, as well as raising awareness of responsibility for their proper operation.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has the knowledge in the field of operation ICT networks and their components, including wireless and fiber optic, used in the local and wide area networks. He knows the switching technic in ICT network and used transmission protocols.	K1_W07	W L	C F H
	2				
Skills	1	The student is able to independently and in a team, carry out engineering tasks and perform basic research, interpret their results and draw conclusions in the field of ICT networks used wireless and fiber optic communication media.	K1_U07	L	F H
	2				
Social Competence	1	The student can act in accordance with the principles of ethics and respect the professional tradition of network workers ICT. It promotes a pro-quality culture and proper patterns of behavior in the professional environment employees dealing with ICT networks for the Internet.	K1_K04	W L	C F H R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Kopka Ryszard
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0

Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course VIII - Administration of enterprise network infrastructure
Nazwa przedmiotu	Przedmiot wybieralny VIII - Administracja infrastrukturą sieciową przedsiębiorstwa

ECTS points	5	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	KW8	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Knowledge in the field of computer networks and systems operational.
		2	
	Skills	1	Skills in the field of computer networks and Operating Systems.
		2	
	Social Competence	1	Ability to interact and work in a group.
		2	

Course Goals Introducing students to the design, implementation and maintenance of the company's network infrastructure.

Programme content The subject provides knowledge in the field of designing and implementing enterprise network infrastructure with particular emphasis on aspects related to redundancy, ensuring business continuity and security.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of design and implementation. enterprise network infrastructure.	K1_W07	W	A
	2	A student can has knowledge of maintenance and solving. problems in the company's network infrastructure.	K1_W07	W	A
Skills	1	A student can plan and implement and secure the infrastructure. enterprise network.	K1_U11	L	C I
	2	A student can maintain and diagnose the work of the infrastructure. enterprise network.	K1_U11	L	C I
Social Competence	1	A student is aware of the responsibility for their own work and readiness to submit to the rules of team work i responsibility for jointly implemented works.	K1_K01	L	I P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr inż. Gola Mariusz
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	40
Independent study of the course topics	28
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Elective course VIII - Database applications
Nazwa przedmiotu	Przedmiot wybieralny VIII - Aplikacje bazodanowe

ECTS points	5	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Examination

Course code	KW8	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge of different database models and how to use them in applications.
		2	
	Skills	1	A student can use SQL and PL/SQL.
		2	The student can program in any programming language.
	Social Competence	1	A student is aware of the importance of proper database design.
		2	

Course Goals The aim of the course is to provide knowledge and skills for designing efficient and scalable database-based applications.

Programme content Appropriate selection of patterns: databases, applications and SQL language. Using database management systems and their functionalities to implement efficient applications using databases.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student understand the legitimacy of using additional functionalities databases improving the operation of the application.	K1_W08	W L	A K
	2				
Skills	1	A student can use indexes, optimize queries for proper operation of the application.	K1_U13	L	K
	2				
Social Competence	1	A student is aware of the need for the correct design of the application database.	K1_K03	L	K
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Piotrowska Ewelina
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	40
Independent study of the course topics	28
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Elective course X - Advanced topics in computer graphics

Nazwa przedmiotu	Przedmiot wybieralny X - Zaawansowane zagadnienia grafiki komputerowej			
ECTS points	2	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	KW10	Subject related to scientific research/pract. profess. prepar. (Y/N)		T

Preliminary requirements of the course	Knowledge	1	A student is knowledge from the lecture Computer Graphics I
		2	
	Skills	1	A student has computer skills and programming proficiency
		2	
	Social Competence	1	A student can properly determine priorities for tasks implementation specified by yourself or other
		2	A student understands the need to learn throughout life; can inspire and organize the learning process of other people

Course Goals Acquiring by students an advanced knowledge in the field of computer graphics

Programme content Lecture in the auditorium. The aim of the course is to get acquainted with advanced computer graphics issues with particular focus on 3D graphics. Laboratory classes will be devoted to programming selected algorithms for advanced graphic transformations.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has an orderly, theoretically founded knowledge covering issues of generating and editing vector, bitmap and three-dimensional graphics	K1_W09	W L	C K M P R
	2	A student Knows the rules of constructing interactive graphics applications	K1_W09	W L	C G P R
	3	A student has up-to-date knowledge about the newest achievements in the field of computer graphics	K1_W09	W L	C G P R
Skills	1	A student can develop extensive models of three-dimensional scene and enrich them with the so-called special effects	K1_U14	P	E K M P R
	2	A student has the necessary preparation for programming three-dimensional graphic applications with the use of programming library	K1_U14	P	E K M P R
	3	A student can prepare a well-documented study computer graphics problems	K1_U14	P	E K M P R
Social Competence	1	A student is able to properly define priorities for implementation self-determined or other tasks	K1_K01	L	K M P R
	2	A student can interact and work in a group, accepting in different roles	K1_K01	L	K M P R

Methods of verification of learning outcomes:
A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0

Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course X - High level programming languages
Nazwa przedmiotu	Przedmiot wybieralny X - Języki programowania wysokiego poziomu

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW10	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Knowledge about Python language programming
		2	
	Skills	1	Knowledge regarding structural, object and network programming
		2	
	Social Competence	1	Group working skills
		2	Capability of using requests and tasks specified by a lecturer / tutor for the sake of probem solving

Course Goals The aim of the module is to provide students with a knowledge regarding higher level languge programming based on Python language

Programme content Python language phylosophy

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowedge in programming and software engineering. Understands basic processes in the computer systems' life cycle.	K1_W06	W L	C H I
	2				
Skills	1	A student can individually and in a team perform engineering tasks and run basic scientific research, interpret it's results and make conclusions	K1_U07	L	C H I R
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	C H I R
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W L	P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr inż. Pala Artur
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Elective course X - Human-machine interface
Nazwa przedmiotu	Przedmiot wybieralny X - Interfejsy człowiek-maszyna

ECTS points	2	Subject type	W-K

Language of lecture	angielski	Mode of completing the course		Course credit
Course code	KW10		Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge of the most frequently used ones programming languages.
		2	
	Skills	1	A student can operate a computer.
		2	A student is able to design a system and describe its operation.
	Social Competence	1	A student should be able to work independently as well as a team member.
		2	

Course Goals	Acquainting students with human-machine interfaces.
Programme content	Content regarding human-machine interfaces.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has knowledge in the basic educational area such as inter alia: mathematics, physics and is able to use them for solving engineering problems	K1_W01	W L	C G H
	2	Student has general knowledge of humanities, social education and social norms.	K1_W03	W L	C G H
	3	Student has knowledge in the engineering disciplines associated with the computer engineering and can use it for problems solving.	K1_W05	W L	C G H
	4	Student has knowledge in creating models of information systems, parameterizing models, conducting research using models of information systems and analyzing results in the context of computer science and related fields.	K1_W09	W L	C G H
	5	Student knows some selected methods of artificial intelligence and their potential application in computer engineering.	K1_W10	W L	C G H
Skills	1	Student is able to use previously obtained knowledge in the area of basic education in order to solve some engineering problems.	K1_U01	L	C G H
	2	Student can work on his/her own and as a team member. He/she is also able to perform engineering tasks and run basic scientific research and to interpret the obtained results making conclusions.	K1_U07	L	C G H
	3	Student can use appropriate tools for both processing and analysis of digital images	K1_U14	L	C G H
	4	Student can apply selected approrpiate methods of Artificial Intelligence to basic scientific tasks.	K1_U15	L	C G H
Social Competence	1	Student is able to make appropriate decisions, also in difficult situations and critically validate his/her knowledge and the range of problems, which he/she can solve either individually or as a part of a team.	K1_K01	W L	C G H
	2	The student is aware of the impact of the tasks performed on the social environment and inspiring activities in the public interest.	K1_K02	W L	C G H
	3	Student can act properly in accordance with ethics and respect to the professional tradition, and promotes a pro-quality culture and the right standards of behaviour in all aspects of life.	K1_K04	W L	C G H

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Kawala-Sterniuk Aleksandra
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
Head of the organizational unit
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Elective course X - Multimedia presentation techniques
Nazwa przedmiotu	Przedmiot wybieralny X - Multimedialne techniki prezentacji

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW10	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge in the field of geometry and graphics, including the creation of technical drawings and the use of basic drawing principles.
		2	A student has basic knowledge of copyright protection.
	Skills	1	A student can use any text editor and spreadsheet to elaborate / compose complex texts and to process and present numerical data.
		2	A student can use a technical drawing to present physical objects and block diagrams of designed algorithms.
	Social Competence	1	A student can properly define priorities for the implementation of a task set by himself or others.
		2	A student can interact and work in a group.

Course Goals - gain practical skills in designing, creating and delivering multimedia presentations, - acquisition of skills in preparing other forms of information dissemination and data visualization.

Programme content Within the scope of the subject, knowledge of creating and conducting multimedia presentations is conveyed. As part of the module, the student acquires knowledge and practical skills in designing, creating, and conducting multimedia presentations, as well as skills in preparing other forms of information and data visualization.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has the knowledge necessary to create advanced multimedia presentations and other ways of presenting information.	K1_W09	W L	C H I J P R
	2				
Skills	1	A student can communicate using various techniques transfer of information in the professional environment and in other environments.	K1_U14	L	H I J P R
	2				
Social Competence	1	A student can present achievements in an appropriate way and present a clearly and interesting presentation of the subject matter.	K1_K02	L	C H I J P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kozioł Michał
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0

Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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dr inż. Zygarlicka Małgorzata
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XI - Computer aided design II
Nazwa przedmiotu	Przedmiot wybieralny XI - Komputerowe wspomaganie projektowania II

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW11	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Required by the PRK level 4
		2	
	Skills	1	Required by the PRK level 4
		2	
	Social Competence	1	The student can work in a team
		2	

Course Goals Advanced 3D modeling techniques, encompassing the creation of technical documentation and animations.

Programme content Creating 3D models 3D visualisation Parametric modelling Dynamic blocks Drawing annotation Programmers interface

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has theoretically founded detailed knowledge related to the use of technical documentation	K1_W09	W L	C I
	2				
Skills	1	The student is able to make and present a 3D model in accordance with the given specification.	K1_U07	L	I
	2				
Social Competence	1	The student understands the need to update the knowledge along with the development of CAD software	K1_K01	L	I
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Dzierżanowski Łukasz
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5

Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
Head of the organizational unit
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XI - Computer networks III
Nazwa przedmiotu	Przedmiot wybieralny XI - Sieci komputerowe III

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW11	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Fundamentals of Computer Networks: A solid understanding of basic networking concepts, including the OSI model, TCP/IP protocols, network topologies, network devices, and fundamental network protocols such as DHCP, DNS, HTTP.
		2	Advanced Protocols and Network Services: Knowledge of advanced network protocols such as OSPF, EIGRP, BGP, VLANs, VPNs, and experience in configuring and managing advanced network services.
		3	Network Security: Basic knowledge of network security, including encryption, security protocols such as SSL/TLS, IPSec, firewall principles, and the basics of Intrusion Detection Systems (IDS) and Intrusion Prevention Systems (IPS).
	Skills	1	Configuration of Network Hardware and Software: Ability to configure and manage network devices such as routers, switches, access points, as well as network software including network operating systems and diagnostic tools.
		2	Analysis and Troubleshooting of Network Issues: The ability to detect, diagnose, and resolve network issues, including connectivity problems, network performance issues, and security concerns.
		3	Network Design: Experience in designing computer networks, including the ability to plan network topologies, select network devices, and plan IP addressing and subnetting schemes.
	Social Competence	1	Teamwork: Experience in working within project teams, the ability to effectively communicate and collaborate with others to design, implement, and manage network projects.
		2	Technical Communication: The skill to clearly communicate complex network and technical concepts to both IT specialists and non-specialists, including preparing technical documentation and presentations.
		3	Ethical and Legal Awareness: Understanding of the ethical and legal aspects related to computer networks, including privacy, data security, and the responsibility for managing and operating network infrastructure.

Course Goals The objectives of the course will be focused on a deep understanding and advanced aspects of the design, implementation, and analysis of computer networks, specifically: advanced network protocols, network security, network and services management, wireless and mobile networks, programmable and virtual networks (SDN and NFV), P2P networks, IoT and new network architectures, advanced network analysis and design, and research and innovations in the field of computer networks.

Programme content The course content will include advanced and specialized topics in the field of computer networks such as advanced routing protocols and traffic management, advanced IP network concepts, network security, network virtualization and network functions, software-defined networking (SDN), performance management and quality of service (QoS), wireless and mobile networks, as well as the Internet of Things (IoT) and future networks.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has basic knowledge for solving engineering tasks.	K1_W01	W L	C H I P
	2	The student has extended and in-depth knowledge of the network computer.	K1_W07	L	H I P
	3	The student has knowledge of development trends and the most important new engineering achievements in the field of computer networks.	K1_W05	W	C H I P
Skills	1	The student can acquire knowledge from various sources concerning computer science, in particular computer networks, on the basis of which it draws appropriate conclusions and formulates and justifies opinions	K1_U01	L	C H I N O R
	2	The student can solve tasks in a creative way	K1_U06	L	H I P R
	3	On the basis of the results obtained, the student can make analyze these data and skillfully use them introduce.	K1_U11	L	H I P R
Social Competence	1	The student understands the necessity of continuous education and improvement of his professional competences.	K1_K01	W	C R
	2	The student can work in a group in which he is a leader.	K1_K04	L	H I P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kopterski Wiesław
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30

Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
Head of the organizational unit
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Elective course XI - Introduction to computer forensics
Nazwa przedmiotu	Przedmiot wybieralny XI - Wprowadzenie do informatyki śledczej

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW11	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge of information technology
		2	A student has basic knowledge of operating systems
		3	A student has basic knowledge of file systems
	Skills	1	A student can use a computer and an operating system
		2	A student can independently make changes to the hardware configuration of a computer
	Social Competence	1	A student can work in a team
		2	

Course Goals The aim of the course is to acquire basic knowledge and skills in the field of securing digital media and analysis of data obtained from protected media in terms of their use as evidence.

Programme content The subject provides knowledge and skills in the field of securing digital media and analysis of data obtained from protected media in terms of their use as evidence.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of the methodology of working with IT system in a digital context evidence.	K1_W07	W L	C H I J
	2	A student knows basic methods, techniques, tools and materials used for protection electronic evidence.	K1_W07	W L	C H I J
	3	A student has basic knowledge of development trends in IT and their impact on processing i data storage on PCs.	K1_W05	W L	C H I J
Skills	1	A student can individually plan and run a live-long self-education process	K1_U05	L	C H I J P R
	2	A student can select the sources of informaction with the use of advanced ICT techniques in the correct way. He can validate and synthesize data from various sources	K1_U06	L	H I J P R
Social Competence	1	A student can make professional decisions.	K1_K01	L	H I J P
	2	A student is aware of the enginner’s impact.	K1_K02	W L	C H I P
	3	A student is able to act ethically.	K1_K04	L	H I J

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Podpora Michał
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Elective course XI - Programming V

Nazwa przedmiotu	Przedmiot wybieralny XI - Programowanie V		
ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	KW11	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge of computer science.
		2	
	Skills	1	A student is ability to operate a computer and create programs in a selected programming language.
		2	
	Social Competence	1	A student can interact and work in a group.
		2	

Course Goals To acquaint students with Python programming methods, to learn about available libraries that expand Python capabilities, to familiarize students with the LaTeX typesetting system and to use Python to automatically generate files for the LaTeX system to convert them to the .pdf format

Programme content Lecture using a multimedia projector presenting selected aspects of the Python language. Using Python to process various types of data and an illustration of how to format these results for .pdf documents using the LaTeX typesetting system.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has detailed knowledge of how to use Python programming language in data processing	K1_W06	W L	C I J K
	2	A student has knowledge about how to create web applications using the Python language	K1_W05	W L	C I J K
Skills	1	A student can prepare an solving the problem application in Python programming language	K1_U07	L	D K
	2	A student can use Python programming language to automate activities related to data processing	K1_U09	L	D K
	3	A student is able to implement a web application using the Django software framework	K1_U10	L	D J K
Social Competence	1	The student is aware of the need to create the correct code	K1_K02	L	P R
	2	The student is convinced of the need for continuous training	K1_K01	L	P R
	3	The student is aware of responsibility for their own work and readiness to comply with the rules of teamwork and responsibility for jointly performed tasks	K1_K04	L	P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15

Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Tomczewski Krzysztof
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Elective course XII - Basics of programming industrial automation systems
Nazwa przedmiotu	Przedmiot wybieralny XII - Podstawy programowania przemysłowych systemów automatyki

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW12	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has an elementary knowledge of electrical engineering, covering the basics of electrical equipment, electronics, and measuring devices.
		2	
	Skills	1	A student be able to apply the learned programming methods, algorithms and data structures to tasks involving the programming of industrial automation systems.
		2	
	Social Competence	1	A student can interact and work in a group.
		2	

Course Goals - providing knowledge about hardware devices and systems used in tasks of controlling devices and processes, - acquisition of skills by the student in the development of basic control systems using a programmable controller.

Programme content Within the subject, knowledge is imparted regarding hardware devices and systems used in tasks related to controlling devices and processes. As part of the module, the student acquires knowledge and skills in developing basic control systems using programmable controllers.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of hardware devices and systems used in equipment and process control tasks.	K1_W05	W	C
	2	A student has knowledge of performing basic control tasks using mobile PLCs and ASi controllers.	K1_W06	W L	C H I J P R
Skills	1	A student can obtain information from technical literature and other sources.	K1_U06	L	H I J P R
	2	A student be able to plan and implement basic control tasks using a mobile programmable controller and ASi controller.	K1_U10	L	H I J P R
Social Competence	1	A student is aware of responsibility for their own work and is ready to follow the rules of teamwork.	K1_K01	W L	C H I J P R
	2	A student can understands the need for continuous learning and a critical approach to the available literature information.	K1_K02	L	H I J P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kozioł Michał
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
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dr inż. Zygarlicka Małgorzata
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Elective course XII - Computational engineering

Nazwa przedmiotu	Przedmiot wybieralny XII - Inżynieria obliczeniowa		
ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	KW12	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge in selected methods of artificial intelligence and their applications in computer science.
		2	
	Skills	1	A student can select the sources of information with the use of advanced ICT techniques in the correct way. He can validate and synthesize data from various sources.
		2	A student can individually and in a team perform engineering tasks and run basic scientific research, interpret it’s results and make conclusions.
	Social Competence	1	A student understands the need of self-improvement
		2	

Course Goals The overview of the advanced computation and analytics algorithms, including the artificial intelligence and data science techniques

Programme content lecture

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in selected methods of artificial intelligence and their applications in computer science.	K1_W10	W L	C J
	2				
Skills	1	A student can select the sources of information with the use of advanced ICT techniques in the correct way. He can validate and synthesize data from various sources.	K1_U06	L	J
	2	A student can individually and in a team perform engineering tasks and run basic scientific research, interpret it’s results and make conclusions.	K1_U07	L	J
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	C J R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Ruszczak Bogdan
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XII - Perception systems for autonomous vehicles
Nazwa przedmiotu	Przedmiot wybieralny XII - Systemy percepcji w pojazdach autonomicznych

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW12	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has an organized and in-depth knowledge in the field of artificial intelligence methods and their application in automation and robotics systems for autonomous vehicles
		2	
	Skills	1	The student can analyze and interpret technical project documentation and utilize scientific literature related to a given problem.
		2	
	Social Competence	1	Student understands the need for technical documentation.
		2	

Course Goals - Imparting knowledge about the construction of autonomous systems - Imparting knowledge about the functioning of the perception layer in ADS systems - Familiarizing students with simulation environments used in testing ADS - Students acquiring knowledge about the construction of an autonomous system

Programme content Within the course, knowledge is conveyed on issues related to the development of autonomous systems, with a special emphasis on the perception element. As part of the module, the student acquires knowledge and skills in the field of designing an autonomy system, including its hardware and algorithmic components. The knowledge gained about the system's operation enables the development of algorithms for the specific component of the perception system and validation in simulation environments.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has basic knowledge of the calculation of measurement errors and evaluation of the measurement result, based on the recorded data.	K1_W10	W	C
	2				
Skills	1	Student is able to apply the appropriate algorithm to build simple perceptual systems	K1_U14	L	I
	2				
Social Competence	1	Student understands the need for constant training and is aware of the current limitations of technology.	K1_K01	L	I
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Michalski Paweł
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5

Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XII - Programming VI
Nazwa przedmiotu	Przedmiot wybieralny XII - Programowanie VI

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW12	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of computer science
		2	
	Skills	1	Ability to create computer programs in a selected programming language
		2	
	Social Competence	1	Student can interact and work in a group
		2	

Course Goals To familiarize students with the JavaScript programming language and its strengths. Particular emphasis will be placed on the specific features of this language, which distinguish it from popular programming languages

Programme content Lecture in the auditorium. Presentation of various features of the JavaScript language and its wide range of applications. Discussion of a number of specialized libraries that allow you to conveniently create web applications

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has detailed knowledge of the methods of use JavaScript elements in creating the code	K1_W06	W L	C K L P R
	2				
Skills	1	Student can use the rich properties of language in creating code	K1_U10	L	C K L P R
	2				
Social Competence	1	The student is convinced of the need for continuous training	K1_K02	W L	P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0

Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Tomczewski Krzysztof
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XIII - Basics of data mining
Nazwa przedmiotu	Przedmiot wybieralny XIII - Podstawy eksploracji danych

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW13	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Knowledge of programming.
		2	Knowledge of analysis and algebra and statistics.
	Skills	1	Ability to programming and abstract thinking.
		2	
	Social Competence	1	Ability to learn independently.
		2	

Course Goals The purpose of the course is to introduce students to basic methods of extracting knowledge from data sets.

Programme content Lecture in an auditorium or remote format. Computer-based activities using specialized software or programming environments. Topics include: introduction to data mining, concepts and definitions, data acquisition methods, methods for cleaning, consolidating, and transforming data, time domain and statistical analysis methods, frequency analysis methods, data filtering methods, methods for examining trends and deviations, methods for identifying outlier observations and anomalies, methods for studying correlation and association, feature dimension reduction methods, methods of pattern evaluation and feature selection, methods for visualizing data.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a basic knowledge of data mining.	K1_W05	W L	C H I J
	2	A student has a basic understanding of how to prepare data for applications using artificial intelligence methods.	K1_W10	W L	C H I J
Skills	1	A student has the ability to select and apply an appropriate data mining method.	K1_U15	L	H I J
	2				
Social Competence	1	A student is able to independently or collaboratively solve a task in the area of data mining.	K1_K01	W L	P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Wotzka Daria
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0

Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
Head of the organizational unit
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XIII - Image analysis and recognition
Nazwa przedmiotu	Przedmiot wybieralny XIII - Analiza i przetwarzanie obrazu

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW13	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student possesses organized and advanced knowledge in the field of statistical methods and algorithmics.
		2	
	Skills	1	Student can independently implement algorithms in Python based on a schematic.
		2	
	Social Competence	1	Student understands the need for process automation
		2	

Course Goals -Conveying knowledge on fundamental concepts related to digital images, including image representation, compression, filtration, edge detection, segmentation, and image transformation. -Developing students' skills in applying various algorithms for pattern recognition, classification, motion tracking, and texture analysis. -Enabling students to acquire knowledge on how to use programming languages and tools (e.g., Python with libraries such as OpenCV, PIL, scikit-image) for image processing and analysis.

Programme content The image processing course introduces the basics of digital images, filtering and processing techniques, edge detection, and segmentation methods. It covers pattern recognition, machine learning, and applications in object recognition and medical image analysis. The classes combine theory with practical examples, preparing for solving real-world computer vision problems.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student knows the basic concepts in the field image processing, knows selected methods and tools	K1_W06	W	C
	2				
Skills	1	Student can use tools and the methods used in image processing	K1_U14	L	I
	2				
Social Competence	1	Student can propose solutions from the scope of image processing, which can contribute to solutions to simple problems.	K1_K01	L	L
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Michalski Paweł
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5

Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XIII - IT tools in engineering practice
Nazwa przedmiotu	Przedmiot wybieralny XIII - Narzędzia informatyczne w praktyce inżynierskiej

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW13	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic and advanced knowledge in the field of computer science
		2	
	Skills	1	A student is ability to use various information technologies
		2	
	Social Competence	1	A student can interact and work in a group
		2	

Course Goals	To acquaint students with modern tools useful in the work of IT specialists

Programme content	Lecture with the use of a multimedia projector. The aim of the classes in this subject is to show the possibilities of using commonly used advanced infoematic tools - the VIM editor, the Git version control system, the LaTeX publication system.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has detailed knowledge about typesseting system and version control methods	K1_W06	W L	C P R
	2	A student has knowledge of selected computer tools In engineering	K1_W06	W L	C P R
Skills	1	A student can prepare professional documents based on source code prepared in a text composition system.	K1_U03	L	H P R
	2	A student can use in practice the tools that are used to controlling the version of the code	K1_U10	L	H P R
	3	A student can create applications using selected computer tools used in engineering activities	K1_U09	L	H P R
Social Competence	1	A student is aware of the need to create the correct code	K1_K04	W L	P R
	2	The student is convinced of the need for continuous training	K1_K01	W L	P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Kamiński Marcin
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0

Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Tomczewski Krzysztof
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Elective course XIII - Signal processing in embedded systems
Nazwa przedmiotu	Przedmiot wybieralny XIII - Przetwarzanie sygnałów w systemach wbudowanych

ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	KW13	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A Student knows the basics of C/C++ programming language.
		2	A Student knows the basics of numerical algorithms
	Skills	1	A Student has skills in C/C++ language.
		2	
	Social Competence	1	A student is aware of continuous learning.
		2	

Course Goals The subject aims to present computer science in embedded systems, which can be used to process electrical, audio, and biomedical signals. The student will learn to implement digital signal processing algorithms with limited hardware resources in embedded systems.

Programme content - Introduction to advanced microprocessor systems. - Programming of peripherals using dedicated libraries. - Implementation of selected data processing algorithms. - Application of real-time operating systems.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowledge of embedded systems.	K1_W05	W	C P
	2	A student with knowledge of C++ programming and dedicated RTOS.	K1_W06	W	C P
Skills	1	A student can individually plan and run a lifelong self-education process.	K1_U05	L	I J P
	2	A student can utilize knowledge solved with signal processing discipline.	K1_U09	L	I J P
Social Competence	1	A student can make decisions in complex situations and critically validate his knowledge.	K1_K01	W L	P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr hab. inż. Szmajda Mirosław
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Szmajda Mirosław
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Electrical engineering for IT specialists
Nazwa przedmiotu	Elektrotechnika dla informatyków

ECTS points	4	Subject type	P

Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P10	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student knows the fundamental laws of physics concerning electricity and magnetism.
		2	
	Skills	1	The student knows how to solve a set of linear equations.
		2	The student knows how to calculate equations with complex numbers.
	Social Competence	1	The student can cooperate with other students.
		2	

Course Goals The subject provides knowledge regarding electrical circuits. Students during the course get information about methods how to solve constant and alternating current electrical circuits. Also, students acquire knowledge about resonant circuits, magnetically coupled circuits and two-port networks.

Programme content The course aims to provide students with knowledge about electrical circuits.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has basic knowledge of phenomena occurring in direct and alternating current electrical circuits.	K1_W01	W C	C I J
	2				
Skills	1	A student can solve a simple direct and alternating current circuits.	K1_U01	C	C I J
	2				
Social Competence	1	A student can make decisions independently, also in difficult situations. Can critically evaluate own knowledge.	K1_K01	W C	C I J
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	prof. dr hab. inż. Tomczuk Bronisław
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	15
Examination or final colloquium	0
Additional contact hours	0
Total student workload	105
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr hab. inż. Koteras Dariusz
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Politechnika Opolska
Wydział Elektrotechniki, Automatyki i Informatyki
Karta Opisu Przedmiotu

Kierunek studiów	Computer Engineering
Profil kształcenia	Ogólnoakademicki
Poziom studiów	Studia pierwszego stopnia
Specjalność	
Forma studiów	Studia stacjonarne
Semestr studiów	Czwarty
Nazwa przedmiotu	Foreign language

Subject Title	Język obcy		
Liczba punktów ECTS	2	Typ przedmiotu	W
Język wykładowy	polski	Tryb zaliczenia przedmiotu (E/Z)	Zaliczenie na ocenę

Kod przedmiotu	OWJO2	Przedmiot powiązany z badaniami naukowymi/ prakt. przygot. zawodowym (T/N)	N

Oczekiwania wstępne w zakresie przedmiotu	Wiedza	1	In accordance with the recommendations of PRK level 4.
		2	
	Umiejętności	1	In accordance with the recommendations of PRK level 4.
		2	
	Kompetencje społeczne	1	In accordance with the recommendations of PRK level 4.
		2	

Cele przedmiotu: Development of the four basic language skills (speaking, reading, writing, and listening) as well as communicative skills and competencies at level A of the Common European Framework of Reference for Languages (CEFR).

Treści programowe zapewniające uzyskanie efektów uczenia się dla przedmiotu: The course provides the student with universal linguistic knowledge: vocabulary, phrases, and structures as well as intercultural knowledge necessary for establishing and maintaining communication with target language users according to level A of the Common European Framework of Reference for Languages (CEFR). The student develops the four basic language skills - listening, speaking, reading, and writing, and learns the basic grammar (declensions, conjugations, basic parts of speech, present, past, and future tenses) required at level A according to the CEFR, and acquires the skills of searching, using and selecting information from various sources - including the use of online dictionaries and translators as well as language learning applications.

Efekty uczenia się dla przedmiotu - po zakończonym cyklu studiów			Odniesienie do kierunkowych efektów uczenia się	Formy realizacji (W, C, L, P, S)	Formy weryfikacji efektów uczenia się
Wiedza	1	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.	K1_W04	L	C E F P
	2				
Umiejętności	1	A student can use a foreign language at the B2 level of the European language evaluation scale.	K1_U04	L	C E F P
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	C E F P
Kompetencje społeczne	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Formy weryfikacji efektów uczenia się:

A-egzamin pisemny, B-egzamin ustny, C-zaliczenie pisemne, D-zaliczenie ustne, E-na podstawie ocen cząstkowych z odpowiedzi ustnych, F-na podstawie ocen cząstkowych z odpowiedzi pisemnych, G-praca kontrolna, H-ocena ze sprawozdań, I-ocena z przebiegu ćwiczeń, J-ocena z przygotowania do ćwiczeń, K-ocena z przebiegu realizacji projektu, L-ocena pisemnej realizacji projektu, M-ocena z obrony projektu, N-ocena formy prezentacji, O-ocena treści prezentacji, P-obserwacja aktywności na zajęciach, R-obserwacja systematyczności.

Godziny w planie studiów		
Forma zajęć	Liczba godzin zajęć w semestrze	Opiekun (koordynator) przedmiotu (tytuł/stopień naukowy/ tytuł zawodowy, imię i nazwisko)
Wykład	0	dr Świerczewska Beata
Ćwiczenia	0	
Laboratorium	30	
Projekt	0	
Seminarium	0	

Nakład pracy studenta	
Rodzaje zajęć studenta*	Średnia liczba godzin* przeznaczonych na zrealizowane aktywności
Wykład	0
Ćwiczenia	0
Laboratorium	30
Projekt	0
Seminarium	0
Przygotowanie do zajęć	8
Przygotowanie sprawozdania/referatu/ projektu/prezentacji	4

Samodzielne studiowanie tematyki zajęć	8
Egzamin lub kolokwium zaliczeniowe	0
Dodatkowe godziny kontaktowe	0
Łączny nakład pracy studenta	50
Liczba godzin kontaktowych (z planu studiów)	30

* godzina (lekcyjna) oznacza 45 minut

dr Świerczewska Beata
Kierownik jednostki organizacyjnej/bezpośredni przełożony
(pieczęć/podpis)

dr inż. Zygarlicka Małgorzata
Dziekan Wydziału
(pieczęć/podpis)

Politechnika Opolska
Wydział Elektrotechniki, Automatyki i Informatyki
Karta Opisu Przedmiotu

Kierunek studiów	Computer Engineering
Profil kształcenia	Ogólnoakademicki
Poziom studiów	Studia pierwszego stopnia
Specjalność	
Forma studiów	Studia stacjonarne
Semestr studiów	Piąty

Nazwa przedmiotu	Foreign language
Subject Title	Język obcy

Liczba punktów ECTS	2	Typ przedmiotu	W
Język wykładowy	polski	Tryb zaliczenia przedmiotu (E/Z)	Zaliczenie na ocenę

Kod przedmiotu	OWJO3	Przedmiot powiązany z badaniami naukowymi/ prakt. przygot. zawodowym (T/N)	N

Oczekiwania wstępne w zakresie przedmiotu	Wiedza	1	In accordance with the recommendations of PRK level 4.
		2	
	Umiejętności	1	In accordance with the recommendations of PRK level 4.
		2	
	Kompetencje społeczne	1	In accordance with the recommendations of PRK level 4.
		2	

Cele przedmiotu: Development of the four basic language skills (speaking, reading, writing, and listening) as well as communicative skills and competencies at level A of the Common European Framework of Reference for Languages (CEFR).

Treści programowe zapewniające uzyskanie efektów uczenia się dla przedmiotu: The course provides the student with universal linguistic knowledge: vocabulary, phrases, and structures as well as intercultural knowledge necessary for establishing and maintaining communication with target language users according to level A of the Common European Framework of Reference for Languages (CEFR). The student develops the four basic language skills - listening, speaking, reading, and writing, and learns the basic grammar (declensions, conjugations, basic parts of speech, present, past, and future tenses) required at level A according to the CEFR, and acquires the skills of searching, using and selecting information from various sources - including the use of online dictionaries and translators as well as language learning applications.

Efekty uczenia się dla przedmiotu - po zakończonym cyklu studiów			Odniesienie do kierunkowych efektów uczenia się	Formy realizacji (W, C, L, P, S)	Formy weryfikacji efektów uczenia się
Wiedza	1	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.	K1_W04	L	C E F P
	2				
Umiejętności	1	A student can use a foreign language at the B2 level of the European language evaluation scale.	K1_U04	L	C E F P
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	C E F P
Kompetencje społeczne	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Formy weryfikacji efektów uczenia się:

A-egzamin pisemny, B-egzamin ustny, C-zaliczenie pisemne, D-zaliczenie ustne, E-na podstawie ocen cząstkowych z odpowiedzi ustnych, F-na podstawie ocen cząstkowych z odpowiedzi pisemnych, G-praca kontrolna, H-ocena ze sprawozdań, I-ocena z przebiegu ćwiczeń, J-ocena z przygotowania do ćwiczeń, K-ocena z przebiegu realizacji projektu, L-ocena pisemnej realizacji projektu, M-ocena z obrony projektu, N-ocena formy prezentacji, O-ocena treści prezentacji, P-obserwacja aktywności na zajęciach, R-obserwacja systematyczności.

Godziny w planie studiów

Forma zajęć	Liczba godzin zajęć w semestrze	Opiekun (koordynator) przedmiotu (tytuł/stopień naukowy/ tytuł zawodowy, imię i nazwisko)
Wykład	0	dr Świerczewska Beata
Ćwiczenia	0	
Laboratorium	30	
Projekt	0	
Seminarium	0	

Nakład pracy studenta

Rodzaje zajęć studenta*	Średnia liczba godzin* przeznaczonych na zrealizowane aktywności
Wykład	0
Ćwiczenia	0
Laboratorium	30
Projekt	0
Seminarium	0
Przygotowanie do zajęć	8
Przygotowanie sprawozdania/referatu/ projektu/prezentacji	4
Samodzielne studiowanie tematyki zajęć	8
Egzamin lub kolokwium zaliczeniowe	0
Dodatkowe godziny kontaktowe	0
Łączny nakład pracy studenta	50
Liczba godzin kontaktowych (z planu studiów)	30

* godzina (lekcyjna) oznacza 45 minut

dr Świerczewska Beata
Kierownik jednostki organizacyjnej/bezpośredni przełożony
(pieczęć/podpis)

dr inż. Zygarlicka Małgorzata
Dziekan Wydziału
(pieczęć/podpis)

Politechnika Opolska
Wydział Elektrotechniki, Automatyki i Informatyki
Karta Opisu Przedmiotu

Kierunek studiów	Computer Engineering
Profil kształcenia	Ogólnoakademicki
Poziom studiów	Studia pierwszego stopnia
Specjalność	
Forma studiów	Studia stacjonarne
Semestr studiów	Szósty

Nazwa przedmiotu	Foreign language
Subject Title	Język obcy

Liczba punktów ECTS	2	Typ przedmiotu	W
Język wykładowy	polski	Tryb zaliczenia przedmiotu (E/Z)	Egzamin

Kod przedmiotu	OWJO4	Przedmiot powiązany z badaniami naukowymi/ prakt. przygot. zawodowym (T/N)	N

Oczekiwania wstępne w zakresie przedmiotu	Wiedza	1	In accordance with the recommendations of PRK level 4.
		2	
	Umiejętności	1	In accordance with the recommendations of PRK level 4.
		2	
	Kompetencje społeczne	1	In accordance with the recommendations of PRK level 4.
		2	

Cele przedmiotu: Development of the four basic language skills (speaking, reading, writing, and listening) as well as communicative skills and competencies at level A of the Common European Framework of Reference for Languages (CEFR).

Treści programowe zapewniające uzyskanie efektów uczenia się dla przedmiotu: The course provides the student with universal linguistic knowledge: vocabulary, phrases, and structures as well as intercultural knowledge necessary for establishing and maintaining communication with target language users according to level A of the Common European Framework of Reference for Languages (CEFR). The student develops the four basic language skills - listening, speaking, reading, and writing, and learns the basic grammar (declensions, conjugations, basic parts of speech, present, past, and future tenses) required at level A according to the CEFR, and acquires the skills of searching, using and selecting information from various sources - including the use of online dictionaries and translators as well as language learning applications.

Efekty uczenia się dla przedmiotu - po zakończonym cyklu studiów			Odniesienie do kierunkowych efektów uczenia się	Formy realizacji (W, C, L, P, S)	Formy weryfikacji efektów uczenia się
Wiedza	1	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.	K1_W04	L	A B C E F P
	2				
Umiejętności	1	A student can use a foreign language at the B2 level of the European language evaluation scale.	K1_U04	L	A B C E F P
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	A B C E F P
Kompetencje społeczne	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Formy weryfikacji efektów uczenia się:

A-egzamin pisemny, B-egzamin ustny, C-zaliczenie pisemne, D-zaliczenie ustne, E-na podstawie ocen cząstkowych z odpowiedzi ustnych, F-na podstawie ocen cząstkowych z odpowiedzi pisemnych, G-praca kontrolna, H-ocena ze sprawozdań, I-ocena z przebiegu ćwiczeń, J-ocena z przygotowania do ćwiczeń, K-ocena z przebiegu realizacji projektu, L-ocena pisemnej realizacji projektu, M-ocena z obrony projektu, N-ocena formy prezentacji, O-ocena treści prezentacji, P-obserwacja aktywności na zajęciach, R-obserwacja systematyczności.

Godziny w planie studiów		
Forma zajęć	Liczba godzin zajęć w semestrze	Opiekun (koordynator) przedmiotu (tytuł/stopień naukowy/ tytuł zawodowy, imię i nazwisko)
Wykład	0	dr Świerczewska Beata
Ćwiczenia	0	
Laboratorium	30	
Projekt	0	
Seminarium	0	

Nakład pracy studenta	
Rodzaje zajęć studenta*	Średnia liczba godzin* przeznaczonych na zrealizowane aktywności
Wykład	0
Ćwiczenia	0
Laboratorium	30
Projekt	0
Seminarium	0
Przygotowanie do zajęć	10
Przygotowanie sprawozdania/referatu/ projektu/prezentacji	6
Samodzielne studiowanie tematyki zajęć	12
Egzamin lub kolokwium zaliczeniowe	2
Dodatkowe godziny kontaktowe	0
Łączny nakład pracy studenta	60
Liczba godzin kontaktowych (z planu studiów)	30

* godzina (lekcyjna) oznacza 45 minut

dr Świerczewska Beata
Kierownik jednostki organizacyjnej/bezpośredni przełożony
(pieczęć/podpis)

dr inż. Zygarlicka Małgorzata
Dziekan Wydziału
(pieczęć/podpis)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth

Course Title	Foreign language		
Nazwa przedmiotu	Język obcy		
ECTS points	2	Subject type	W
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	OWJO2	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student knows vocabulary and grammar structures of the English Language at B2 level as defined by the Common European Framework of Reference for Languages (CEFR)
		2	
	Skills	1	The student can use the English language at B2 level as defined by the Common European Framework of Reference for Languages (CEFR)
		2	
	Social Competence	1	A student can cooperate in a group accepting various roles.
		2	A student understands the need for self-study..

Course Goals To acquire language skills in the field of science and disciplines relevant to studied faculty in accordance with requirements specified for C level of European Language Level scale (CEFR)

Programme content In the course students acquire technical vocabulary in the area of Computer Engineering as well as the language of work environment (conducting meetings, concluding contracts, negotiations and conversations with partners and clients, giving presentations, solving problems and conflicts, arguing, presenting offers, analyzing job offers, preparing job applications – curriculum vitae, cover letter) . As part of the module, the student acquires real-world knowledge, develops four basic language skills - listening, speaking, reading and writing, and extends the ability to seek, use and select tinformation from different sources .The course is focused on active implementing technical and academic vocabulary with the view of students' future business and scientific careers.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows and understands English terminology at C level as defined by the Common European Framework of Reference for Languages (CEFR)	K1_W04	L	C E F P
	2				
Skills	1	The student can use the English language at C level as defined by the Common European Framework of Reference for Languages (CEFR).	K1_U04	L	C E G P
	2	The student can individually plan and run a live-long self-education process.	K1_U05	L	C E F P
Social Competence	1	The student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	mgr Kowalczyk Bogusława
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	8

Preparation of a report/paper/ project/presentation	4
Independent study of the course topics	8
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Świerczewska Beata
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth
Course Title	Foreign language
Nazwa przedmiotu	Język obcy

ECTS points	2	Subject type	W
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	OWJO3	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student knows vocabulary and grammar structures of the English Language at B2 level as defined by the Common European Framework of Reference for Languages (CEFR)
		2	
	Skills	1	The student can use the English language at B2 level as defined by the Common European Framework of Reference for Languages (CEFR)
		2	
	Social Competence	1	The student can cooperate in a group accepting various roles.
		2	The student understands the need for self-study.

Course Goals To acquire language skills in the field of science and disciplines relevant to studied faculty in accordance with requirements specified for C level of the Common European Framework of Reference for Languages (CEFR)

Programme content In the course students acquire technical vocabulary in the area of Computer Engineering as well as the language of work environment (conducting meetings, concluding contracts, negotiations and conversations with partners and clients, giving presentations, solving problems and conflicts, arguing, presenting offers, analyzing job offers, preparing job applications – curriculum vitae, cover letter) . As part of the module, the student acquires real-world knowledge, develops four basic language skills - listening, speaking, reading and writing, and extends the ability to seek, use and select tinformation from different sources .The course is focused on active implementing technical and academic vocabulary with the view of students' future business and scientific careers.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows and understands English terminology at C level as defined by the Common European Framework of Reference for Languages (CEFR).	K1_W04	L	C E F P
	2				
Skills	1	The student can use the English language at C level as defined by the Common European Framework of Reference for Languages (CEFR).	K1_U04	L	C E F P
	2	Can individually plan and run a live-long self-education process.	K1_U05		C E F P
Social Competence	1	The student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	mgr Kowalczyk Bogusława
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	8
Preparation of a report/paper/ project/presentation	4
Independent study of the course topics	8
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Świerczewska Beata
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Foreign language
Nazwa przedmiotu	Język obcy

ECTS points	2	Subject type	W
Language of lecture	angielski	Mode of completing the course	Examination

Course code	OWJO4	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student knows vocabulary and grammar structures of the English Language at B2 level as defined by the Common European Framework of Reference for Languages (CEFR)
		2	
	Skills	1	he student can use the English language at B2 level as defined by the Common European Framework of Reference for Languages (CEFR)
		2	
	Social Competence	1	A student can cooperate in a group accepting various roles.
		2	A student understands the need for self-study.

Course Goals To acquire language skills in the field of science and disciplines relevant to studied faculty in accordance with requirements specified for C level of the Common European Framework of Reference for Languages (CEFR)

Programme content In the course students acquire technical vocabulary in the area of Computer Engineering as well as the language of work environment (conducting meetings, concluding contracts, negotiations and conversations with partners and clients, giving presentations, solving problems and conflicts, arguing, presenting offers, analyzing job offers, preparing job applications – curriculum vitae, cover letter) . As part of the module, the student acquires real-world knowledge, develops four basic language skills - listening, speaking, reading and writing, and extends the ability to seek, use and select tinformation from different sources .The course is focused on active implementing technical and academic vocabulary with the view of students' future business and scientific careers.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows and understands English terminology at C level as defined by the Common European Framework of Reference for Languages (CEFR)	K1_W04	L	A B C E F P
	2				
Skills	1	The student can use the English language at C level as defined by the Common European Framework of Reference for Languages (CEFR).	K1_U04	L	A B C E F P
	2	Can individually plan and run a live-long self-education process.	K1_U05	L	A B C E F P
Social Competence	1	The student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	mgr Kowalczyk Bogusława
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	10

Preparation of a report/paper/ project/presentation	6
Independent study of the course topics	12
Examination or final colloquium	2
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Świerczewska Beata
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Politechnika Opolska
Wydział Elektrotechniki, Automatyki i Informatyki
Karta Opisu Przedmiotu

Kierunek studiów	Computer Engineering
Profil kształcenia	Ogólnoakademicki
Poziom studiów	Studia pierwszego stopnia
Specjalność	
Forma studiów	Studia stacjonarne
Semestr studiów	Trzeci
Nazwa przedmiotu	Foreign language
Subject Title	Język obcy

Liczba punktów ECTS	2	Typ przedmiotu	W
Język wykładowy	polski	Tryb zaliczenia przedmiotu (E/Z)	Zaliczenie na ocenę

Kod przedmiotu	OWJO1	Przedmiot powiązany z badaniami naukowymi/ prakt. przygot. zawodowym (T/N)	N

Oczekiwania wstępne w zakresie przedmiotu	Wiedza	1	In accordance with the recommendations of PRK level 4.
		2	
	Umiejętności	1	In accordance with the recommendations of PRK level 4.
		2	
	Kompetencje społeczne	1	In accordance with the recommendations of PRK level 4.
		2	

Cele przedmiotu: Development of the four basic language skills (speaking, reading, writing, and listening) as well as communicative skills and competencies at level A of the Common European Framework of Reference for Languages (CEFR).

Treści programowe zapewniające uzyskanie efektów uczenia się dla przedmiotu: The course provides the student with universal linguistic knowledge: vocabulary, phrases, and structures as well as intercultural knowledge necessary for establishing and maintaining communication with target language users according to level A of the Common European Framework of Reference for Languages (CEFR). The student develops the four basic language skills - listening, speaking, reading, and writing, and learns the basic grammar (declensions, conjugations, basic parts of speech, present, past, and future tenses) required at level A according to the CEFR, and acquires the skills of searching, using and selecting information from various sources - including the use of online dictionaries and translators as well as language learning applications.

Efekty uczenia się dla przedmiotu - po zakończonym cyklu studiów			Odniesienie do kierunkowych efektów uczenia się	Formy realizacji (W, C, L, P, S)	Formy weryfikacji efektów uczenia się
Wiedza	1	A student knows and understands a foreign language theory and terminology at the B2 level of the European language evaluation scale.	K1_W04	L	C E F P
	2				
Umiejętności	1	A student can use a foreign language at the B2 level of the European language evaluation scale.	K1_U04	L	C E F P
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	C E F P
Kompetencje społeczne	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K_K01	L	P
	2				

Formy weryfikacji efektów uczenia się:
A-egzamin pisemny, B-egzamin ustny, C-zaliczenie pisemne, D-zaliczenie ustne, E-na podstawie ocen cząstkowych z odpowiedzi ustnych, F-na podstawie ocen cząstkowych z odpowiedzi pisemnych, G-praca kontrolna, H-ocena ze sprawozdań, I-ocena z przebiegu ćwiczeń, J-ocena z przygotowania do ćwiczeń, K-ocena z przebiegu realizacji projektu, L-ocena pisemnej realizacji projektu, M-ocena z obrony projektu, N-ocena formy prezentacji, O-ocena treści prezentacji, P-obserwacja aktywności na zajęciach, R-obserwacja systematyczności.

Godziny w planie studiów		
Forma zajęć	Liczba godzin zajęć w semestrze	Opiekun (koordynator) przedmiotu (tytuł/stopień naukowy/ tytuł zawodowy, imię i nazwisko)

Wykład	0	dr Świerczewska Beata
Ćwiczenia	0	
Laboratorium	30	
Projekt	0	
Seminarium	0	

Nakład pracy studenta	
Rodzaje zajęć studenta*	Średnia liczba godzin* przeznaczonych na zrealizowane aktywności
Wykład	0
Ćwiczenia	0
Laboratorium	30
Projekt	0
Seminarium	0
Przygotowanie do zajęć	8
Przygotowanie sprawozdania/referatu/ projektu/prezentacji	4
Samodzielne studiowanie tematyki zajęć	8
Egzamin lub kolokwium zaliczeniowe	0
Dodatkowe godziny kontaktowe	0
Łączny nakład pracy studenta	50
Liczba godzin kontaktowych (z planu studiów)	30

* godzina (lekcyjna) oznacza 45 minut

dr Świerczewska Beata
Kierownik jednostki organizacyjnej/bezpośredni przełożony
(pieczęć/podpis)

dr inż. Zygarlicka Małgorzata
Dziekan Wydziału
(pieczęć/podpis)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Third		
Course Title	Foreign language		
Nazwa przedmiotu	Język obcy		
ECTS points	2	Subject type	W

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	OWJO1	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student has lexical and grammar knowledge of English at B2 level according to European Language Level scale (CEFR) for foreign languages.
		2	
	Skills	1	A student can use English language in a communicative manner at B2 level according to European Language Level scale (CEFR)
		2	
	Social Competence	1	A student can cooperate in a group accepting various roles.
		2	A student understands the need for self-education.

Course Goals To acquire language skills in the field of science and disciplines relevant to studied faculty in accordance with requirements specified for C level of European Language Level scale (CEFR)

Programme content In the course students acquire technical vocabulary in the area of Computer Engineering and language of work environment (conducting meetings, concluding contracts, negotiations and conv as well as conversations with partners and clients, giving presentations, solving problems and conflicts, arguing, presenting offers, analyzing job offers, preparing job applications – curriculum vitae, cover letter) . As part of the module, the student acquires real-world knowledge, develops four basic language skills - listening, speaking, reading and writing, and extends the ability to seek, use and select tinformation from different sources. The course is focused on active implementing technical and academic vocabulary the view of students' future business and scientific careers.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student knows and understands a foreign language theory and terminologythe at C level according to European Language Level scale (CEFR).	K1_W04	L	C E F P
	2				
Skills	1	The student can use a foreign language at C level of European Language Level scale (CEFR)	K1_U04	L	C E F P
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	C E F P
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	L	P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	mgr Kowalczyk Bogusława
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	8
Preparation of a report/paper/ project/presentation	4

Independent study of the course topics	8
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Świerczewska Beata
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First

Course Title	Information technology
Nazwa przedmiotu	Technologia informacyjna

ECTS points	2	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P4	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student has fundamental knowledge regarding information technology issues, including knowledge of the basics of the binary system, computer architecture.
		2	
	Skills	1	A student has fundamental knowledge in mathematics, including basics of algebra and mathematical analysis necessary to describe and analyze the operation of computer systems and perform arithmetic operations on binary numbers.
		2	
	Social Competence	1	A student is able to work independently as well as a team member.
		2	

Course Goals - Conveying knowledge to students about the representation of fixed-point and floating-point data, - Introduce the student to the implementation of logical and arithmetic operations, - Acquisition of skills by the student in the field of positional systems, - Introduction to the basics of combinational circuits, - Familiarization with network addressing methods.

Programme content Within the subject, knowledge is imparted regarding the representation of fixed-point and floating-point data, as well as the implementation of logical and arithmetic operations. As part of the module, the student acquires knowledge and skills in the basics, including positional systems, combinational circuits, and network addressing.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a basic knowledge of the representation of fixed and floating point data and the implementation of logical and arithmetic operations.	K1_W01	W C	C I P R
	2	A student has basic knowledge of developmental trends in new solutions applied in internet technologies.	K1_W05	W	C
Skills	1	A student he can work individually and in a team, apply the principles of occupational health and safety and estimate the time needed to complete the commissioned task ensuring meeting deadlines.	K1_U02	C	C I P R
	2	A student can obtain information from literature and other sources, integrate the obtained information, interpret it, as well as draw conclusions and formulate and justify opinions.	K1_U06	C	C I P R
Social Competence	1	A student is aware of the impact of the tasks performed on the social environment and is able to initiate actions for the public interest.	K1_K02	W C	C I P R
	2				

Methods of verification of learning outcomes: A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Kozioł Michał
Calculation class (C)	15	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	15
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	15
Examination or final colloquium	0
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering

Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third

Course Title	Internet technologies
Nazwa przedmiotu	Technologie internetowe

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	K11	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student should have basic knowledge of HTML and CSS.
		2	
	Skills	1	The student should have basic skills in Internet technology.
		2	
	Social Competence	1	Ability to work in a group.
		2	

Course Goals Preparing Students for the design of websites.

Programme content Programmed content that will ensure the achievement of learning outcomes for the subject are issues in the area of broadly understood Internet technologies. The course will also focus on presenting information on specific programming solutions, including popular frameworks. HTML, CSS technology and popular scripting languages in the area of web technologies will be discussed in detail.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has knowledge of creating and use of databases.	K1_W08	W P	C F G H
	2	The student has well-established knowledge in the field of graphics computer and its applications.	K1_W09	W P	C F G H
Skills	1	The student has knowledge of creating and use of databases.	K1_U06	P	L M
	2	The student is able to see non-technical aspects, systemic, social and ethical in the implementation of tasks engineering.	K1_U03	P	L M
	3	The student has the ability to use knowledge from different engineering disciplines related to IT i use it to create systems IT, which can include applications web.	K1_U09	P	L M
Social Competence	1	A Student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W P	C F G H
	2	The student is able to act in accordance with the principles of ethics professional. Promotes good practices in professional environment and beyond.	K1_K04	W P	C F G H

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	30	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0

Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First

Course Title	Linear algebra with analytic geometry
Nazwa przedmiotu	Algebra liniowa z geometrią analityczną

ECTS points	5	Subject type	P
Language of lecture	angielski	Mode of completing the course	Examination

Course code	P3	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Knowledge of basic procedures for solving linear equations. Knowledge of solving quadratic equations. Knowledge of drawing graphs in a rectangular coordinate system.
		2	Knowledge of algorithms for working with matrices and solving matrix equations.
		3	Knowledge of the application of the method of least squares and knowledge of data processing.
	Skills	1	The student controls the mathematical operations of vector and matrix algebra. The student knows how to algorithmise and program these operations.
		2	The student can prepare input data for analysis using computer technology and interpret the calculation results.
		3	The student can independently process the graphic materials needed to calculate the task.
		4	The student knows the basic procedures of mathematical optimisation.
	Social Competence	1	Students are able to use modern tools (calculators, computers, multimedia) and information sources (manuals, encyclopedias, network resources).
		2	

Course Goals Providing the background for more advanced mathematical and technical courses. Application of matrix calculus for solving computationally demanding technical problems. Knowledge application of analytical geometry for solving technical problems.

Programme content Lecture in auditorium based on usage of visualisation of a computer algebra system. The exercise provided an independent solution of sample examples, and the results were discussed with students. Continuous control of the achieved level of knowledge through written tests. Lectures, exercises and solved tests are immediately published on the subject's e-learning pages.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Students know basic theorems of algebra, algebraic structures and their relationships.	K1_W01	W C	A C F P
	2	Students are knowledgeable in terms of algebraic concepts and methods important in further mathematical and computer education.	K1_W01	W C	A C F P
	3	Students understand the universality and generality of linear algebra.	K1_W01	W C	A C F P
Skills	1	Students are able to use basic mathematical concepts of linear algebra.	K1_U01	C	C F P
	2	Students are able to use complex numbers, matrix calculus, and is able solve any system of linear equations.	K1_U01	C	C F P
	3	Students use an algebraic description of objects and geometric transformations in the 3-D space.	K1_U01	C	C F P
Social Competence	1	Students are aware of the need for continued training, in particular, in methods of modern mathematics used in the technology.	K1_K01	W C	C E G P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. Barton Stanislav
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	30
Laboratory class (L)	0

Project (P)	0
Seminar (S)	0
Preparation for classes	35
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	0
Examination or final colloquium	2
Additional contact hours	0
Total student workload	127
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Logic and set theory
Nazwa przedmiotu	Logika i teoria mnogości

ECTS points	2	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P11	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Linear algebra and analytical geometry.
		2	Knowledge of the basic concepts of set calculus.
	Skills	1	Ability to perform basic algebraic calculations.
		2	Ability to perform basic set theory calculations.
	Social Competence	1	Communication skills, note-taking skills.
		2	Awareness of responsibility for work.

Course Goals Providing logical foundations and concepts of set theory for mastering programming languages and problem solving IT.
Programme content The subject provides knowledge and skills in the field of such topics as: set, operations on sets, Cartesian product of sets, functional relation, ordering relation, equivalence relation, algebraic system, cardinal numbers of sets, propositional logic, binary Boolean algebra, logic of concepts, predicate logic, fuzzy set and fuzzy logic.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge of the laws of propositional calculus and quantifier calculus. A student has knowledge of proving techniques and basics of logic of concepts.	K1_W01	W	C
	2	A student has knowledge of the properties of relations and functions.	K1_W01	W	C
	3	A student has knowledge of the cardinal numbers of sets.	K1_W01	W	C
	4	A student has knowledge of the basics of algebraic systems and Boolean algebras.	K1_W01	W	C
	5	A student has knowledge of basics of fuzzy logic and other non-classical logics.	K1_W01	W	C
Skills	1	A student can able to check the tautology of expressions, perform operations on sentences and predicates, and conduct proofs.	K1_U01	C	C F
	2	A student uses various relations and functions. A student does set theory operations on sets.	K1_U01	C	C F
	3	A student can determine cardinal numbers for infinite sets and prove the equinumerous of sets.	K1_U01	C	C F
	4	A student can use the properties of Boolean algebras.	K1_U01	C	C F
	5	A student understands the differences between classical logic and non-classical logics.	K1_U01	C	C F
Social Competence	1	A student knows the limitations of his own knowledge and understands the need further education.	K1_K01	W C	E P
	2	A student can independently search for information in the literature, also in materials in foreign languages.	K1_K01	W C	E P
	3	A student can work in a team.	K1_K04	W C	E P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr Lupenko Serhii
Calculation class (C)	15	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	15
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First

Course Title	Mathematical analysis I			
Nazwa przedmiotu	Analiza matematyczna I			
ECTS points	4	Subject type		P
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	P2	Subject related to scientific research/pract. profess. prepar. (Y/N)		N

Preliminary requirements of the course	Knowledge	1	Students have knowledge of mathematics at the secondary school level (high school level).
		2	
	Skills	1	Ability of abstract and logical thinking.
		2	Ability to perform basic algebraic calculations.
		3	English language knowledge (min B1 level).
	Social Competence	1	The ability to co-work in a group.
		2	Understanding of need for self-education.
		3	Student's responsibility for his own work.

Course Goals Providing the background for more advanced mathematical and technical courses.
Programme content Lecture in auditorium.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Students have theoretical knowledge concerning differential and integral calculus of functions of a single variable.	K1_W01	W C	C F P
	2	Students have knowledge with regard to application of differential and integral calculus of single variable functions.	K1_W01	W C	C F P
	3	Students know English terminology used in mathematics.	K1_W01	W C	C F P
Skills	1	Students can calculate the derivative of the function and understand its geometric and physical interpretation and evaluate the accuracy of approximation of functions by polynomials and can calculate indefinite and definite integrals by selecting appropriate calculation methods.	K1_U01	C	C F P
	2	Students are able to evaluate the accuracy of approximation of functions by polynomials.	K1_U01	C	C F P
	3	Students are able to calculate indefinite and definite integrals by selecting appropriate calculation methods.	K1_U01	C	C F P
	4	Students use English during the solving process of tasks on mathematical analysis.	K1_U01	C	C F P
Social Competence	1	Students are able to apply simple mathematical models and mathematical logic in solving practical problems and team leadership.	K_K01	W C	C F P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Marszałek Wiesław
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload

Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	50
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	2
Additional contact hours	0
Total student workload	112
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second

Course Title	Mathematical analysis II
Nazwa przedmiotu	Analiza matematyczna II

ECTS points	3	Subject type	P
Language of lecture	angielski	Mode of completing the course	Examination

Course code	P7	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Knowledge of fundamental algebra, symbolic mathematical logic and set theory.
		2	Knowledge of differential calculus of functions of one variable.
		3	Knowledge of integral calculus of functions of one variable.
	Skills	1	Skills of abstract and logic reasoning.
		2	Skills of proofing simple theorem from algebra.
		3	Skills of formulation of problems in mathematical language.
		4	Skills of formulation of mathematical problems in the English language.
	Social Competence	1	The ability to co-work in a group.
		2	Understanding of need for self-education.
		3	Student's responsibility for his own work.

Course Goals	Providing the background for more advanced mathematical and technical courses.

Programme content	Lecture in audytorium.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Students have knowledge with regard to differential calculus of multivariable functions.	K1_W01	W C	A C E P
	2	Students have knowledge regarding to the application of differential calculus of multivariable functions, especially regarding to solve optimization problems.	K1_W01	W C	A C E P
	3	Students have knowledge regarding to algorithms of expansions of functions in power series and trigonometric series.	K1_W01	W C	A C E P
Skills	1	Students are able to calculate partial derivatives and directional derivatives and understand their geometric and physical interpretation.	K1_U01	C	A C F P
	2	Students are able to use differential calculus of multivariable function to optimization problems.	K1_U01	C	A C F P
	3	Students are able to perform spectral analysis of periodic processes by using Fourier series.	K1_U01	C	A C F P
Social Competence	1	Students understand need of continuous improvement in the range of applying of modern mathematics methods used in technology.	K1_K01	C	C F P
	2	Students more effectively cooperate and work in a group of co-workers.	K1_K01	C	C P

Methods of verification of learning outcomes: A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Marszałek Wiesław
Calculation class (C)	15	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	15
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	0
Examination or final colloquium	2
Additional contact hours	0
Total student workload	77
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering

Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Methodology for scientific research
Nazwa przedmiotu	Metodyka badań naukowych

ECTS points	2	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P14	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has general knowledge of IT and computer architecture.
		2	
	Skills	1	A student has the ability to solve basic technical problems
		2	
	Social Competence	1	A student can work in a group.
		2	

Course Goals	Preparing students to conduct scientific research.
Programme content	Methods and examples of determining the research problem.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a knowledge with methodology of scientific research in the engineering disciplines associated with the computer science.	K1_W05	W C	C I J
	2				
Skills	1	A student can use specialist terminology with methodology of scientific research and judge other opinions in a debate.	K1_U06	C	C I J
	2	A student can consider non-technical, systemic, social, and ethical aspects during the execution, formulation, and resolution of engineering tasks.	K1_U03	C	C I J
	3	A student is able to carry out engineering tasks and conduct basic scientific research, analyze results, create documentation, and prepare publications (or other written works).	K1_U07	C	C I J
	4	A student can use specialized terminology within the scope of the studied field, including in foreign languages.	K1_U08	C	C I J
Social Competence	1	A student can act in accordance with ethics and respect to the professional tradition in methodolgy of scientific research.	K1_K01	C	I
	2	A student is preparing a publication, he acts in accordance with ethical principles.	K1_K04	C	I

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Nagi Łukasz
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities

Lecture (W)	15
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	0
Preparation of a report/paper/ project/presentation	5
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh

Course Title	Modern technologies in computer science
Nazwa przedmiotu	Nowoczesne technologie w informatyce

ECTS points	1	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	K21	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has knowledge in the field of software engineering, algorithms and creating software in selected programming languages.
		2	The student has basic knowledge in the field of construction and using relational databases.
		3	The student has knowledge of the operation of popular operating systems and attitudes of computer networks (services, protocols).
	Skills	1	The student is able to use text editor, chosen programming environment, coud install the necessary software and implement selected functionalities in the chosen programming language.
		2	The student can design and program a simple relational database data. Can use operating systems and write and run applications on them.
		3	The student could - when formulating and solving engineering tasks - recognize their systemic and non-technical aspects, including their impact on work of other IT systems.
	Social Competence	1	The student could interact and work in a group.
		2	

Course Goals The mail goal is to familiarize students with the latest trends in the IT industry, both technologies and tools with work environments. Presentation of perspectives in particular IT departments and demand for specialists on the market in Poland and Europe.

Programme content Informative lecture, problem lecture, description, instruction, conversational lecture and discussion, if possible: didactic, situational method, cases, workshop method. The mail goal is to familiarize students with the latest trends in the IT industry, both technologies and tools with work environments. Presentation of perspectives in particular IT departments and demand for specialists on the market in Poland and Europe.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows advanced concepts and concepts of technology systems and applications used in industry.	K1_W05	W	C D E P
	2	The student has knowledge about the development trends of systems information systems, including database ones, used in big IT companies.	K1_W06	W	C D N P R
	3	The student knows the basic methods, techniques, tools and software used to create complex applications and high availability systems.	K1_W06	W	C D P
Skills	1	.			
	2				
Social Competence	1	The student understands the need to learn throughout life.	K1_K01	W	E O R
	2	Has the ability to assess phenomena and behaviors, can determine priorities for actions performed in situations difficult.	K1_K02	W	R
	3	The student can share knowledge and others.	K1_K03	W	E R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Zatwarnicka Anna
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0

Seminar (S)	0
Preparation for classes	0
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	30
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth
Course Title	Numerical methods
Nazwa przedmiotu	Metody numeryczne

ECTS points	2	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P13	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student can use a suitable numerical method corresponding to the solved problem.
		2	
	Skills	1	The student can independently convert the assigned technical problem into a task from the field of numerical mathematics and find its solution.
		2	The student has an overview of the algorithms of numerical mathematics and can use them effectively. He can use the corresponding algorithms in a suitable computer environment.
		3	The student can correctly interpret the results of calculations.
	Social Competence	1	The student can work in a group.
		2	

Course Goals The student can develop and implement numerical mathematical methods independently.

Programme content Lecture in auditorium supported by the computer algebra system and audiovisual equipment.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has general knowledge of the numerical methods related to IT.	K1_W01	W L	C G I
	2				
Skills	1	The student can select the sources of the information correctly using advanced ICT techniques and evaluate and synthesize data from various sources.	K1_U06	L	C G I
	2				
Social Competence	1	The student makes decisions, also in difficult situations, critically evaluates his knowledge and the range of problems solved both individually and in a team.	K1_K01	W L	C G I
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. Barton Stanislav
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	5
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third
Course Title	Operating systems I

Nazwa przedmiotu	Systemy operacyjne I		
ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination
Course code	K10	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Fundamentals of Programming: Understanding of basic programming concepts, including variables, loops, functions, and data structures. Knowledge of at least one programming language, such as C/C++ or Python, is crucial as many operating systems courses require students to write low-level code.
		2	Basics of Computers and Computer System Architecture: Understanding how computers work at the hardware level, including knowledge of processors, memory, input/output devices, and other computer system components.
		3	Basic Knowledge of Operating Systems: A general understanding of what an operating system is and the functions it serves, including process management, memory management, and file systems.
	Skills	1	Analytical and Problem-Solving Skills: The ability to analyze technical problems and think logically to find solutions, which is crucial for debugging code and understanding complex operating systems.
		2	Low-Level Programming Skills: The ability to write and understand low-level code that is close to hardware, such as programming in C or assembly language, often required to understand the internal mechanisms of an operating system.
		3	Understanding of Abstract System Concepts: The ability to understand and work with abstract system concepts such as processes, threads, address spaces, and other system constructs.
	Social Competence	1	Teamwork: The ability to work effectively in a group, as many projects within the operating systems course may require collaboration.
		2	Technical Communication: The skill to clearly and precisely communicate complex technical concepts, both orally and in writing, which is crucial for documenting projects and presenting solutions.
		3	Professional Ethics and Social Awareness: Understanding of the ethical and social implications of technology, especially in terms of privacy, security, and accessibility, which is important in the context of designing and implementing operating systems that are used by a broad audience.

Course Goals The objectives of the course are for students to gain a comprehensive understanding of key concepts, mechanisms, and strategies used in modern operating systems such as: understanding the role and functions of operating systems, knowledge of operating system architecture, understanding and ability to manage processes, memory management and file systems, understanding input/output and device control, security and protection in operating systems, practical skills in using operating systems.

Programme content The course content will cover both theoretical foundations and practical applications of operating systems such as: introduction to operating systems, process management, memory management, file systems, input and output operations, security and protection, the operating system user interface, and an overview of contemporary operating systems.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in the computer networks and operating systems area.	K1_W07	W L	A H I
	2				
Skills	1	A student can install, configure and administer operating systems, with the use of appropriate methods and techniques	K1_U12	L	A H I
	2	A student can individually plan and run a live-long self-education process.	K1_U05	L	A H I
Social Competence	1	A student can act in accordance with ethics and respect to the professional tradition. Promotes a pro-quality culture and the right standards of behaviour both in the professional environment and private life.	K1_K04	W L	P R
	2	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team	K1_K01	W L	P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr inż. Kopterski Wiesław
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	30
Examination or final colloquium	2
Additional contact hours	0
Total student workload	142
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth
Course Title	Operating systems II
Nazwa przedmiotu	Systemy operacyjne II

ECTS points	5	Subject type	K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	K14	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student has Knowledge from course Operating systems I
		2	
	Skills	1	Student has Skills from course Operating systems I
		2	
	Social Competence	1	Student can interact and work in a group, taking on different roles.
		2	

Course Goals The main goal for this module is to provide students with knowledge about some selected aspects of systems administration

Programme content Programmed content that will ensure the achievement of learning outcomes for the subject are issues in the area of broadly understood operating systems. The course will also focus on presenting information about the system kernel, system architecture and their types. Systems from Microsoft, Linux and Apple will be discussed.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has knowledge in the computer networks and operating systems area.	K1_W07	W L	C I
	2				
Skills	1	Student can install modern operating systems.	K1_U12	L	I
	2	Student can individually plan and run a live-long self-education process.	K1_U05	L	I
	3	Student is able to configure and administer modern operating systems.	K1_U12	L	I
Social Competence	1	Student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W L	C I
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	25
Independent study of the course topics	25
Examination or final colloquium	0
Additional contact hours	0
Total student workload	135
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third

Course Title	Physical education		
Nazwa przedmiotu	Wychowanie fizyczne		
ECTS points	0	Subject type	W
Language of lecture	angielski	Mode of completing the course	Credit unrated
Course code	OWWF1	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Student has knowledge of individual and team sports.
		2	Student has knowledge about recreational forms of physical activity.
	Skills	1	Student can perform basic elements of the technique of a selected sport.
		2	
	Social Competence	1	Student is capable to co-work in an exercising group
		2	

Course Goals Taking care of health, consolidating active attitudes towards physical culture as well as educating and improving physical skills in the field of a selected sport discipline or various forms of physical recreation.

Programme content The curriculum content includes the concepts of physical activity and sport as well as selected issues in the field of methodology of teaching technical elements in selected team and individual disciplines. They also include the rules of participation in sports disciplines and recreational physical activity, as well as the basics of refereeing.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has the knowledge of professional ethics, necessary to make moral decisions, respecting human rights, taking into account the categories of justice in everyday life, sport and physical recreation.		C	R
	2				
Skills	1	Student has the ability to understand and analyze interpersonal relationships, including the causes and effects of conflict situations in the workplace, and is able to propose preventive actions.		C	R
	2				
Social Competence	1	Student understands the need for lifelong learning, broadening knowledge, and knows the possibilities of further education.		C	R
	2	Student is ready to interact and cooperate in a group, taking on different roles in it.		C	R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	dr inż. Tataruch Magdalena
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0

Preparation for classes	0
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	30
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Woś Barbara
Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth

Course Title	Physical education
Nazwa przedmiotu	Wychowanie fizyczne

ECTS points	0	Subject type	W
Language of lecture	angielski	Mode of completing the course	Credit unrated

Course code	OWWF2	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Student has knowledge of individual and team sports.
		2	Student has knowledge about recreational forms of physical activity.
	Skills	1	Student can perform basic elements of the technique of a selected sport.
		2	
	Social Competence	1	Student is capable to co-work in an exercising group
		2	

Course Goals Taking care of health, consolidating active attitudes towards physical culture as well as educating and improving physical skills in the field of a selected sport discipline or various forms of physical recreation.
Programme content The curriculum content includes the concepts of physical activity and sport as well as selected issues in the field of methodology of teaching technical elements in selected team and individual disciplines. They also include the rules of participation in sports disciplines and recreational physical activity, as well as the basics of refereeing.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has the knowledge of professional ethics, necessary to make moral decisions, respecting human rights, taking into account the categories of justice in everyday life, sport and physical recreation.		C	R
	2				
Skills	1	Student has the ability to understand and analyze interpersonal relationships, including the causes and effects of conflict situations in the workplace, and is able to propose preventive actions.		C	R
	2				
Social Competence	1	Student understands the need for lifelong learning, broadening knowledge, and knows the possibilities of further education.		C	R
	2	Student is ready to interact and cooperate in a group, taking on different roles in it.		C	R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	dr inż. Tataruch Magdalena
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload

Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	0
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	30
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Woś Barbara
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First

Course Title	Physics I
Nazwa przedmiotu	Fizyka I

ECTS points	5	Subject type	P
Language of lecture	angielski	Mode of completing the course	Examination

Course code	P1	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Basics of mathematics. Drawing graphs.
		2	
	Skills	1	The student understands the function of mechanical, hydromechanical and thermomechanical systems. He can control their activity; he understands the data of control devices.
		2	The student can optimise the operation of technical mechanisms regarding energy consumption and operation efficiency.
		3	The student has a basic overview of modern physics.
	Social Competence	1	Students can think and act individually and work in groups.
		2	

Course Goals The aim of the course is to provide students with the knowledge necessary to understand phenomena and physical processes in nature and to apply the laws of nature in technology and in everyday life, as well as to familiarize students with methods of determining and measuring physical quantities

Programme content Lecture in auditorium room combined with multimedia and computer algebra presentation. In the exercise, independent solution of sample examples and discussion with students about the results. Continuous control of the achieved level of knowledge through written tests. Lectures, exercises and solved tests are immediately published on the subject's e-learning pages.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has knowledge in the area of physics for solving engineering problems.	K1_W01	W C	A B E F P
	2	Student understands the basics of natural and technological processes.	K1_W01	W C	A B E F P
Skills	1	Student can utilize gained knowledge in the area of physics for solving problems.	K1_U01	C	A B E F P
	2	The student is able to implement the basics of natural and technological procedures in solving practical tasks.	K1_U01	C	A B E F P
	3	Student has the ability for self-education.	K1_U05	C	A B E F P
Social Competence	1	Student can make decisions, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	W C	A B E F P R
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. Barton Stanislav
Calculation class (C)	15	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	15
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	43
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	35
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second

Course Title	Physics II
Nazwa przedmiotu	Fizyka II

ECTS points	2	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P9	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Basics of higher mathematics, basics of mechanics and thermomechanics.
		2	
	Skills	1	The student can independently connect a simpler electrical circuit and measure its necessary quantities.
		2	The student can correctly evaluate the measured electrical quantities and change the properties of the circuit as needed.
		3	The student knows the basics of quantum and nuclear physics.
	Social Competence	1	Students can think and act individually and work in groups.
		2	

Course Goals Provide students with the knowledge necessary to understand phenomena and physical processes in nature and to apply the laws of nature in technology and in everyday life.

Programme content Lecture in auditorium room combined with multimedia and computer algebra presentation.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	Student has knowledge in the area of physics for solving engineering problems.	K1_W01	W L	C F I P
	2				
Skills	1	The student can utilize gained knowledge in the area of physics for solving engineering problems and can apply physical laws in solving technical problems	K1_U01	L	C F I P
	2	The student can practically use his knowledge of work safety and ergonomy, economy, and an economic evaluation of proposed engineering solutions.	K1_U02	L	C F I P
	3	The student can individually and in a team perform engineering tasks, run basic scientific research, interpret its results, and make conclusions.	K1_U07	L	I J P R
Social Competence	1	Student is able to validate his knowledge and improve his skills and reflect new knowledges.	K1_K01	L	E I P R
	2	Student understands the need to adhere to safety and workplace hygiene principles, professional and social ethics, respect for diversity of views, and is aware of the importance of applying principles and conducting oneself in accordance with the spirit of professionalism.	K1_K04	L	E I P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. Barton Stanislav
Calculation class (C)	0	
Laboratory class (L)	15	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities

Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Practical training - 4 weeks
Nazwa przedmiotu	Praktyka zawodowa – 4 tygodnie

ECTS points	6	Subject type	W-PR
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	OWPZ	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student has basic knowledge in the field of ergonomics and work safety.
		2	The student has basic knowledge of running a business and intellectual property protection.
	Skills	1	The student can carry out engineering tasks and carry out engineering and scientific research independently and in a team.
		2	
	Social Competence	1	The student has understands the need and knows the possibilities of continuous training and raising professional, personal and social competences.
		2	

Course Goals Implementation of the professional practice program. To familiarize the student with the practical aspects of an IT specialist's work.

Programme content The implementation of the course tasks requires that the student undergoes professional practice in an IT company or a company with a large enough IT department to ensure the achievement of the subject learning outcomes.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows and understands issues in the field of computer science necessary to perform the assigned tasks.	K1_W05	P	H K P R
	2	The student knows the requirements of future employers regarding the principles of teamwork, quality management and the use of new development trends in selected areas of IT.	K1_W02	P	H K P R
Skills	1	The student is able to use devices and programs that he learned during the practice.	K1_U07	P	H K P R
	2	The student is able to plan and carry out the process of self-learning within the discipline of computer science and related areas.	K1_U05	P	H K P R
	3	The student is able to apply in practice: the principles of ergonomics, occupational health and safety, intellectual property protection law, economic law and make an economic assessment of the proposed engineering solutions.	K1_U02	P	H K P R
	4	The student is able to work individually and in a group and to organize such work by carrying out the tasks entrusted by the internship tutor in the enterprise.	K1_U07	P	H K P R
Social Competence	1	The student is able to use the acquired knowledge in the enterprise.	K1_K01	P	H K P R
	2	The student is aware of the impact of the tasks performed on the company's operations.	K1_K02	P	H K P R
	3	The students acts in accordance with the principles of ethics and respect for professional traditions.	K1_K04	P	H K P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	0	dr inż. Pala Artur
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	160	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	160
Seminar (S)	0
Preparation for classes	0
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	160
Number of contact hours (from the study plan)	160

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	First		
Course Title	Programming I		
Nazwa przedmiotu	Programowanie I		
ECTS points	4	Subject type	K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	K1	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of programming
		2	Basic knowledge of structural programming
		3	Basic knowledge of object-oriented programming
	Skills	1	Basic structural programming skills
		2	Basic object-oriented programming skills
	Social Competence	1	Team work skills
		2	

Course Goals The aim of the course is to provide students with knowledge of the principles of object-oriented programming and to acquire by students the practical ability to create object-oriented applications in a high-level programming language

Programme content The subject provides knowledge of the principles of object-oriented programming and the practical ability to create object-oriented applications in a high-level programming language

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowedge in a selected high-level programming language.	K1_W06	W L	C H I J P R
	2	Has basic knowledge of the syntax and semantics of the non-object C++ language	K1_W06	W L	C H I J P R
Skills	1	A student can create a console application using appropriate programming environment.	K1_U07	L	H I J
	2				
Social Competence	1	A student can make professional decisions, critically validating his knowledge.	K1_K01	W L	H I J P R
	2	A student can initiate activities for good of the public interest.	K1_K03	L	H I J
	3	Is able to obtain necessary information and share knowledge with others.	K1_K04	L	H I J P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Podpora Michał
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Programming II

Nazwa przedmiotu	Programowanie II		
ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination
Course code	K3	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of programming
		2	Basic knowledge of structural programming
		3	Basic knowledge of object-oriented programming
	Skills	1	Basic structural programming skills
		2	Basic object-oriented programming skills
	Social Competence	1	Team work skills
		2	

Course Goals The aim of the course is to provide students with knowledge of advanced programming using a selected high-level programming language

Programme content The subject provides knowledge on advanced programming techniques using a selected high-level programming language

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowedge in programming and software engineering.	K1_W06	W L	A H I J
	2	Knows the basic methods, techniques and tools of object-oriented programming and techniques for creating graphical applications in modern high-level programming languages.	K1_W06	W L	A H I J
Skills	1	A student can use object-oriented programming techniques to create applications that perform tasks typical for engineering activities.	K1_U07	L	H I J
	2				
Social Competence	1	A student can make informed decisions.	K1_K01	W L	A I J O P R
	2	Is able to assess the quality of the code created and strive to improve it.	K1_K04	W L	A I J O P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Podpora Michał
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	20
Examination or final colloquium	2
Additional contact hours	0
Total student workload	132
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third

Course Title	Programming III		
Nazwa przedmiotu	Programowanie III		
ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination
Course code	K4	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge about structured and object oriented programming.
		2	
	Skills	1	Basic skills in the field of structured and object oriented programming.
		2	
	Social Competence	1	Reading and understanding technical text in the field of Computer Science.
		2	Ability to carry out orders and tasks given by the teacher.

Course Goals The aim of the course is to provide students with knowledge about the principles of programming in C# language.

Programme content The subject provides knowledge regarding object-oriented programming in C# language. Students during the course get information regarding classes, objects and structures in C#, like: attributes, methods, constructors, destructors, and access modifiers. Also, students acquire knowledge of how to use inheritance and polymorphism.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has basic knowledge of programming, especially in the C# language.	K1_W06	W	A
	2	The student has advanced knowledge of object-oriented programming.	K1_W06	W	A
Skills	1	The student can independently create simple software using object-oriented techniques.	K1_U10	L	E F I
	2	The student can independently select appropriate object-oriented techniques for the requirements of a given task. The student can independently select appropriate object-oriented techniques for the requirements of a given task.	K1_U06	L	E F
Social Competence	1	The student can carry out the tasks set before him.	K1_K02	L	E I
	2				

Methods of verification of learning outcomes: A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Wajnert Dawid
Calculation class (C)	0	
Laboratory class (L)	30	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	50
Examination or final colloquium	2
Additional contact hours	0
Total student workload	142
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering

Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth

Course Title	Programming IV
Nazwa przedmiotu	Programowanie IV

ECTS points	4	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	K13	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge to use object-oriented programming in C #, including mechanisms such as inheritance, constructors, virtual methods, polymorphism, delegates.
		2	
	Skills	1	A student has practical skills in implementing selected programming issues using the Visual Studio environment and C# programming language.
		2	
	Social Competence	1	A student has the ability to constantly acquire knowledge and inquisitiveness.
		2	

Course Goals Preparing students for advanced object-oriented programming.

Programme content The scope of the material covers programming in the high-level language C#.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has extended knowledge of programming in the C# programming language.	K1_W06	W P	C G K
	2				
Skills	1	A student can use knowledge from engineering disciplines related to computer science in the creation of information systems.	K1_U10	P	C G K
	2				
Social Competence	1	A student can independently make decisions, critically evaluate his knowledge of programming in C # and the scope of issues to be solved.	K1_K01	W P	C G K
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr inż. Pokuta Waldemar
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	30	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	10

Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr inż. Zatwarnicka Anna
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth

Course Title	Software engineering
Nazwa przedmiotu	Inżynieria oprogramowania

ECTS points	5	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	K12	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student should have basic knowledge of the application development process.
		2	
	Skills	1	Students should have basic skills in programming languages.
		2	
	Social Competence	1	Ability to work in a group.
		2	

Course Goals Preparing students to document the software development process.

Programme content Programmed content that will ensure learning outcomes for the subject are issues from the broadly understood area of software engineering. The course will also focus on presenting information on IT project management methodologies, such as Agile. Additionally, the UML language will be discussed.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowedge in programming and software engineering.	K1_W06	W C	A E I J
	2	A student has understands basic processes in the computer softwares' life cycle.	K1_W08	W C	A E I J
Skills	1	A student can design, according to a given specification, perform and maintain computer engineering with appropriate methods and techniques.	K1_U09	C	E I J
	2	A student is able to design and improve his own computer program.	K1_U10	C	E I J
Social Competence	1	A student can make decisions in difficult situations. validate his knowledge in software engineering and the range of problems solved individually.	K1_K01	W C	A E I J
	2	Students are aware of the accomplished task's impact and can initiate activities for good of the public interest.	K1_K02	W C	A E I J

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr hab. inż. Paszkiel Szczepan
Calculation class (C)	30	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	30
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0

Preparation for classes	15
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	20
Examination or final colloquium	2
Additional contact hours	0
Total student workload	127
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second

Course Title	Statistical methods
Nazwa przedmiotu	Metody statystyczne

ECTS points	2	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P8	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge in the field of mathematics, including algebra in the field the level of secondary school and obtained during the first semester of study
		2	
	Skills	1	A student can use the known mathematical methods to analyze and processing the results of calculations.
		2	
	Social Competence	1	A student can interact and work in a group.
		2	

Course Goals Familiarize students with the use of parametric and descriptive statistical methods to analyze the test results. Introduction to the issues of regression analysis and correlation for the purpose of correct evaluation of measurement results using graphical interpretation.

Programme content Concepts of mathematical statistics

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems.	K1_W01	W C	C I J P
	2				
Skills	1	A student can utilize gained knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems.	K1_U01	C	C I J P
	2				
Social Competence	1	A student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team. A student can clearly identify and present statistical issues in both social and technical terms.	K1_K01	W C	C I J P
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	15	dr inż. Nagi Łukasz
Calculation class (C)	15	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	15
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	10
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	7
Examination or final colloquium	0
Additional contact hours	0
Total student workload	57
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Fifth		
Course Title	Team project of IT system		
Nazwa przedmiotu	Projekt zespołowy systemu informatycznego		
ECTS points	5	Subject type	K

Language of lecture	angielski	Mode of completing the course	Examination
Course code	K18	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has knowledge in the field of software engineering, algorithms creating software in selected programming languages.
		2	The student has basic knowledge in the field of construction and use relational databases.
		3	The student has knowledge of the operation of popular operating systems and attitudes of computer networks (services, protocols).
	Skills	1	The student knows the text editor, chosen programming environment, can install the necessary software yourself and program a selected issue in the chosen language software.
		2	The student is able to design and program a simple relational database data. Can use operating systems and write and run applications on them.
		3	The student can - when formulating and solving engineering tasks - recognize their systemic and non-technical aspects, including their impact on work of other IT systems.
	Social Competence	1	The student can interact and work in a group.
		2	

Course Goals Preparing students for work in modernly managed project teams. Familiarizing students with modern methodologies of software development.

Programme content Informative lecture, problem lecture, description, instruction, conversational lecture, if possible didactic discussion, situational method, cases. As part of the course, students will be familiarized with currently used teamwork methodologies, especially the modern approach. Students will become familiar with the roles, ceremonies and artifacts in methodolody and will practice practically implementing tasks during project classes.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows advanced concepts and concepts of technology systems and applications used in industry.	K1_W06	W	A D E P
	2	The student has knowledge about the development trends of systems IT, including database ones, used in large IT companies.	K1_W08	W	A D O
	3	The student knows the basic methods, techniques, tools and software used to create complex applications and high availability systems.	K1_W05	W	A D E
Skills	1	The student is able to design and implement advanced IT systems (including web and mobile), using, among others, advanced databases.	K1_U13	P	E L P R
	2	The student can use the software appropriate for the tasks typical of engineering activities.	K1_U06	P	E K M N O P
	3	He can - when formulating and solving engineering tasks - see their systemic and non-technical aspects.	K1_U03	P	E K N O R
Social Competence	1	The student can make decisions regarding the construction of an IT system and work in a software development team.	K1_K01	W P	E L O R
	2	The student is able to locate the implemented project among trends in the IT industry, caring for potential users and for monetization of the implemented IT system.	K1_K03	W P	P R
	3	The student works with respect for the principles of group work and professional ethics. He cares about the quality of his work (quality of code, modules etc.).	K1_K04	W P	E P R

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname

Lecture (W)	30	dr inż. Zatwarnicka Anna
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	30	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	28
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	First		
Course Title	The course in humanities and social sciences I		
Nazwa przedmiotu	Przedmiot humanistyczno-społeczny I		
ECTS points	2	Subject type	W-HS

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	OWHS1	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	According to PRK level 4
		2	
	Skills	1	According to PRK level 4
		2	
	Social Competence	1	Understand the need for improvement in terms of soft skills.
		2	

Course Goals The aim of the course is for the student to acquire knowledge of selected humanistic or social issues.

Programme content The programme content includes issues in the humanities and social sciences selected by the students that enhance the knowledge and social competences of the technical graduate.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowledge of the humanities and social sciences in terms of the topics covered in the course.	K1_W03	W	C P
	2				
Skills	1				
	2				
Social Competence	1	A student he is ready to recognise the importance of knowledge in the humanities and social sciences in problem solving and to critically evaluate his knowledge.	K1_K02	W	C P
	2	A student is aware of the impact of the tasks performed on other people and the social environment.	K1_K02	W	C P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr Zamelski Piotr
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. Solga Brygida
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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	The course in humanities and social sciences II

Nazwa przedmiotu	Przedmiot humanistyczno-społeczny II		
ECTS points	3	Subject type	W-HS
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	OWHS2	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	According to PRK level 4
		2	
	Skills	1	According to PRK level 4
		2	
	Social Competence	1	Understand the need for improvement in terms of soft skills.
		2	

Course Goals The aim of the course is for the student to acquire knowledge of selected humanistic or social issues.

Programme content The programme content includes issues in the humanities and social sciences selected by the students that enhance the knowledge and social competences of the technical graduate.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has a general knowledge of the humanities and social sciences in terms of the topics covered in the course.	K1_W03	W	C P
	2				
Skills	1				
	2				
Social Competence	1	A student he is ready to recognise the importance of knowledge in the humanities and social sciences in problem solving and to critically evaluate his knowledge.	K1_K02	W	C P
	2	A student is aware of the impact of the tasks performed on other people and the social environment.	K1_K02	W	C P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	30	dr Zamelski Piotr
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	45
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	Transitional project			
Nazwa przedmiotu	Praca przejściowa			
ECTS points	3	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	OWPP	Subject related to scientific research/pract. profess. prepar. (Y/N)		N
Preliminary requirements of the course	Knowledge	1	Ability to share data and algorithms with collaborators. Ability to create individual and team control procedures.	
		2		
	Skills	1	Ability to work as a team. Ability to plan teamwork and division of sub-activities. Ability to create a schedule for team activities.	
		2		
	Social Competence	1	The student can properly define the priorities for implementing the task set by himself and others—team discussion ability.	
		2		
Course Goals Preparation for writing a diploma thesis. Ability to participate in scientific activities in a team.				
Programme content Applied information technology team project. Co-responsibility for leading the team and for the results achieved. Cooperation in the final presentation of the achieved results.				

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student has knowledge in the area of basic education, i.e. mathematics, physics, and others necessary for solving engineering problems	K1_W01	P	J M N O P R
	2	The student knows essential topics in work safety and ergonomy, economy, economy law, entrepreneurship principles and copyright protection regulations.	K1_W02	P	I J
	3	The student has a general knowledge of the engineering disciplines associated with computer science	K1_W05	P	J M N O P R
Skills	1	The student can individually plan and run a live-long self-education process	K1_U05	P	I J
	2	The student can select the sources of the information correctly using advanced ICT techniques. He can evaluate and synthesise data from various sources.	K1_U06	P	I
	3	The student can individually and in a team perform engineering tasks, run basic scientific research, interpret its results, and make conclusions.	K1_U07	P	I J M N O
	4	The student can use specialist terminology (also in a foreign language) and judge other opinions in a debate.	K1_U08	P	I J M N O
	5	In carrying out work, student can utilize the knowledge acquired in subjects related to basic sciences.	K1_U01	P	N O P
	6	In carrying out his work, student can also perceive non-technical aspects within his project.	K1_U03	P	N O P
Social Competence	1	The student can make decisions, also in difficult situations, critically validate his knowledge and the range of problems solved both individually and in a team.	K1_K01	P	I J M N O
	2	The student is aware of the impact of the accomplished tasks and can initiate activities for the good of the public interest.	K1_K02	P	I J
	3	Student can work according to the principles of professional ethics.	K1_K04	P	N O P

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	dr hab. Barton Stanislav
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	30	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	0
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth

Course Title	User experience design		
Nazwa przedmiotu	Projektowanie zorientowane na użytkownika		
ECTS points	4	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	K19	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	According to the PRK level 4.
		2	
	Skills	1	According to the PRK level 4.
		2	
	Social Competence	1	The student is able to work in a group.
		2	

Course Goals The aim of the subject is to understand, design, and optimize user interactions with a given product, service, or system, with the goal of providing the most intuitive, satisfying, and efficient user experience possible. This subject focuses on identifying user needs, analyzing their behaviors, and implementing solutions that enhance the quality of interactions and contribute to achieving business goals.

Programme content Introduction to User Experience theory User-centered Design i Human-centered Design Emotional Design Customer Journey Mapping UX workshop (example: Value Proposition Canvas) UX Research Mental and conteptual models Stosowanie heurystyk użyteczności i zasady gestalt Elements of cognitive science (how people read, think and make mistakes) UX writing

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows the assumptions of the UX design process	K1_W05	W P	C
	2	The student understands the importance of universal design principles.	K1_W05	W	C
Skills	1	The student is able to properly prioritize, plan and organize tasks related to the research, analysis and design of useful websites	K1_U03	P	M
	2				
Social Competence	1	Is able to use the knowledge and skills in the field of UX in an entrepreneurial way.	K1_K03	P	M O
	2				

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Dzierżanowski Łukasz
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	30	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	20
Examination or final colloquium	0
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Head of the organizational unit
(stamp/signature)

dr inż. Zygarlicka Małgorzata
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Electrical Engineering, Automatic Control and Informatics
Course Description Card

Field of study	Computer Engineering
Profile of Education	General Academic

Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First

Course Title	Work safety and ergonomic
Nazwa przedmiotu	Bezpieczeństwo pracy i ergonomia

ECTS points	1	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	P5	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	General knowledge about occupational health and safety acquired in high school
		2	
	Skills	1	
		2	
	Social Competence	1	A student abides by the group working principles
		2	

Course Goals To familiarize students with the principles and applications of ergonomics and occupational health and safety in the work environment. Providing knowledge about safety in the workplace, potential hazards, with particular emphasis on the specific work of a computer engineer and computer workstations. Providing knowledge on how to protect health at work and prevent work-related risks.

Programme content The subject provides knowledge on issues related to the principles and applications of ergonomics and occupational health and safety in the work environment. As part of the module, the student acquires knowledge in the field of: planning and organization of an ergonomic workplace, selected regulations and principles regarding occupational health and safety and labor law, the negative impact of the working environment on humans and ways to minimize this impact.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student knows basic topics of work safety and ergonomics with relations to computer engineering	K1_W02	W	C
	2	A student has basic knowledge of labor code and other regulations related to occupational health and safety	K1_W03	W	C
Skills	1				
	2				
Social Competence	1	A student is able to critically validate his knowledge and the range of problems solved both individually and in a team, especially regarding the ergonimics	K1_K01	W	C
	2	A student is aware of the impact of the accomplished tasks on the work environment and is able to initiate actions to improve the ergonomics of the workplace	K1_K02	W	C

Methods of verification of learning outcomes:

A-written exam, B-oral exam, C-written assessment, D-oral assessment, E-based on partial marks of oral answers, F-based on partial marks of written answers, G-term paper, H-assessment from reports, I-assessment from realization of exercises, J-assessment from preparations for exercises, K-assessment from the project implementation, L-assessment of the written implementation of the project, M-assessment of defense of project, N-assessment of form of presentation, O-assessment of content of presentation, P-observation of students' activity, R-observation of the regularity.

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Kunicki Michał
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	0

Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	15
Examination or final colloquium	0
Additional contact hours	0
Total student workload	30
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

prof. dr hab. inż. Borucki Sebastian
Head of the organizational unit
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dr inż. Zygarlicka Małgorzata
Dean of Faculty
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Wydział Elektrotechniki, Automatyki i Informatyki - lista przedmiotów na kierunku Computer Engineering - Studia stacjonarne - Studia pierwszego stopnia (od 2024)

symbol	Algorithms and data structures	Architecture of computers	Artificial intelligence tools	Bachelor of Science thesis	Bachelor of Science seminar	Basics of artificial intelligence	Computer aided design I	Computer graphics I	Computer networks I	Computer networks II	Copyright and economy law	Database basics	Database modelling	Discrete mathematics	Elective course I - Good software development practices	Elective course I - Testing applications and systems	Elective course II - Designing internet solutions	Elective course II - Embedded systems	Elective course III - Computer graphics II	Elective course III - Vision systems	Elective course IV - Administration of network operating systems	Elective course IV - System programming	Elective course IX - Data protection in applications	Elective course IX - Data protection in systems and computer networks	Elective course V - Fundamentals of control engineering	Elective course V - Fundamentals of systems theory	Elective course VI - Corporate IT systems	Elective course VI - Fundamentals of computerized management systems	Elective course VII - Data transmission in computer networks	Elective course VII - Internet teleinformation solutions	Elective course VIII - Administration of enterprise network infrastructure	Elective course VIII - Database applications	Elective course X - Advanced topics in computer graphics	Elective course X - High level programming languages	Elective course X - Human-machine interface	Elective course X - Multimedia presentation techniques	Elective course XI - Computer aided design II	Elective course XI - Computer networks III	Elective course XI - Introduction to computer forensics	Elective course XI - Programming V	Elective course XII - Basics of programming industrial automation systems	Elective course XII - Computational engineering	Elective course XII - Perception systems for autonomous vehicles	Elective course XII - Programming VI	Elective course XIII - Basics of data mining	Elective course XIII - Image analysis and recognition	Elective course XIII - IT tools in engineering practice	Elective course XIII - Signal processing in embedded systems	Electrical engineering for IT specialists	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Information technology	Internet technologies	Linear algebra with analytic geometry	Logic and set theory	Mathematical analysis I	Mathematical analysis II	Methodology for scientific research	Modern technologies in computer science	Numerical methods	Operating systems I	Operating systems II	Physical education	Physical education	Physics I	Physics II	Practical training - 4 weeks	Programming I	Programming II	Programming III	Programming IV	Software engineering	Statistical methods	Team project of IT system	The course in humanities and social sciences I	The course in humanities and social sciences II	Transitional project	User experience design	Work safety and ergonomic
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Wiedza - efekty nie pokryte:
Brak

Umiejętności - efekty nie pokryte:
Brak

Kompetencje - efekty nie pokryte:
Brak