Załącznik nr 2 do uchwały nr 409 Senatu Politechniki Opolskiej z dnia 29.05.2024 r.

Załącznik nr 11 do Księgi Jakości Kształcenia

KARTA PROGRAMU STUDIÓW

Nazwa programu studiów **Environmental Engineering**

Specjalności: przedmioty kierunkowe ogólne - KiOg

Nazwa wydziału **Wydział Mechaniczny**

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 409 Senatu Politechniki Opolskiej
data i numer uchwały Senatu ustalającej kierunkowe efekty uczenia się	29.05.2024 Uchwała nr 409 Senatu Politechniki Opolskiej
dyscyplina wiodąca (w ramach której będzie uzyskiwana ponad połowa efektów uczenia się) – podać udział procentowy	Inżynieria Środowiska, Górnictwo i Energetyka - 100%
pozostałe dyscypliny – podać udział procentowy	
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 - 2770 Razem - 2770

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	0712
związek z misją i strategią rozwoju Politechniki Opolskiej	Kształcenie na kierunku Inżynieria środowiska łączy najlepsze tradycje myśli technicznej z zadaniami dnia dzisiejszego i wyzwaniem wobec szybkich przemian technologicznych współczesnego świata. W działalności edukacyjnej i naukowo-badawczej wydziału łączy to potrzebę kształtowania nowoczesnej myśli wobec przemian ekonomicznych i perspektyw gospodarczych kraju z tworzeniem wartości etycznych świata nauki i techniki. Wokół tego posłannictwa skupiają się nauczyciele i studenci, badacze oraz pracownicy administracji, jak również przedstawiciele otoczenia gospodarczego i społecznego szkoły. Do podstawowych składników tak postrzeganej misji należą: kształcenie, badania naukowe oraz służba społeczna. Sprzyja to integracji i rozwojowi nauki, a także stymuluje kreatywność oraz wzmacnia więzi społeczne z regionem.
wymagania wstępne – oczekiwane kompetencje kandydata (szczególnie w przypadku studiów drugiego stopnia)	Zainteresowania techniczne i matematyczne, ścisły umysł, nastawienie na poszukiwanie nowych rozwiązań technicznych i technologicznych. Kandydat powinien również posiadać umiejętność rozwiązywania problemów i być zorientowany na pracę w grupie. Poziom 4 PRK
zasady rekrutacji (w tym: przedmioty kwalifikacyjne oraz ustalone dla nich współczynniki wagowe)	Podstawę przyjęcia na studia pierwszego stopnia stanowią wybrane wyniki egzaminu maturalnego (dojrzałości). Kryterium decydującym o przyjęciu na studia pierwszego stopnia jest wartość wskaźnika rankingowego obliczanego w oparciu o liczbę punktów uzyskanych za egzaminie maturalnym (dojrzałości), z języka obcego nowożytnego oraz dwóch przedmiotów wybranych z wykazu zestawionego w warunkach rekrutacji. Przedmioty kwalifikacyjne oraz ustalone dla nich współczynniki wagowe: biologia - 2, chemia - 2, fizyka - 2, informatyka - 2, język polski - 0.5, matematyka - 2, język obcy - 0.5.
sposoby weryfikacji zakładanych efektów uczenia się	Zgodnie ze sposobem weryfikacji przewidzianym przez prowadzącego w karcie przedmiotu.

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 / 115
	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 - 69
	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 - 114
	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 - 77

Program studiów zaopiniowany przez organ samorządu studenckiego.

Sylwetka absolwenta

Environmental Engineering, Studia pierwszego stopnia, Studia stacjonarne,

Wiedza:

Absolwent ma rozszerzoną wiedzę z wybranych działów matematyki, fizyki, chemii, biologii i nauk o ziemi w zakresie potrzebnym do opisywania zjawisk i procesów związanych z technologiami inżynierii środowiska. W zaawansowanym stopniu zna metody numeryczne i informatyczne oraz narzędzia i materiały przydatne do rozwiazywania zadań inżynierskich. Zna zasady projektowania inżynierskiego. Zna zasady identyfikowania zagrożeń, bezpieczeństwa i higieny pracy oraz ergonomii w czasie budowy i eksploatacji instalacji stosowanych w inżynierii środowiska. W zaawansowanym stopniu zna zasady rysunku technicznego i grafiki inżynierskiej umożliwiającej rozwiązywanie problemów technicznych z zakresu inżynierii środowiska. Absolwent posiada wiedzę z zakresu układów elektrycznych i termodynamiki pozwalającą na poszerzone rozumienie zasad eksploatacji maszyn i urządzeń. Ma specjalistyczną i usystematyzowaną wiedzę o roli środowiska naturalnego, ma świadomość zagrożeń oraz zna metody ich identyfikacji i ograniczania. Ma stosowną wiedzę z mechaniki, mechaniki płynów, materiałoznawstwa i maszynoznawstwa oraz wytrzymałości materiałów w zakresie potrzebnym do rozumienia zasad działania i konstruowania urządzeń. Absolwent ma wiedzę o potencjale paliw kopalnych i odnawialnych źródłach energii w Polsce. W zaawansowanym stopniu zna gospodarczą i społeczną rolę wykorzystywania odnawialnych źródeł energii. Posiada stosowną do studiowanego kierunku wiedzę z zakresu obserwacji zjawisk i procesów oraz zna metody wykonywania pomiarów charakterystycznych wielkości, istotnych z punktu widzenia inżynierii środowiska. Ma wystarczający dla potrzeb inżynierskich zasób wiedzy o budowie i eksploatacji obiektów budowlanych i infrastruktury komunalnej. Absolwent dysponuje wiedzą z zakresu zjawisk geologicznych, hydrologicznych i klimatycznych. W zaawansowanym stopniu zna zasady racjonalnej gospodarki energetycznej, odpadowej i wodno-ściekowej oraz przepływu ciepła, a także konwersji energii. Ma wiedzę o stosowaniu przepisów prawych, norm oraz wytycznych w projektowaniu i eksploatacji obiektów technicznych. Absolwent ma wiedzę niezbędną do zrozumienia społecznych, ekonomicznych, prawnych, technicznych i pozatechnicznych uwarunkowań działalności inżynierskiej. Zna i rozumie pojęcia i zasady związane z prawem autorskim i patentowym; zna i rozumie fundamentalne dylematy współczesnej cywilizacji. Ma stosowną do studiowanego kierunku wiedzę ekonomiczną oraz wiedzę z zakresu zarządzania w tym zarządzania jakością, prowadzenia działalności gospodarczej oraz transferu technologii. Zna i rozumie teorie i terminologię z zakresu języka obcego umożliwiającą posługiwanie się językiem obcym na poziomie B2 Europejskiego Systemu Opisu Kształcenia Językowego.

Umiejętności:

Absolwent posiada umiejętności samokształcenia się. Pozyskuje informacje z literatury, baz danych oraz innych źródeł związanych z naukami technicznymi. Potrafi integrować uzyskane informacje, dokonywać ich interpretacji, wyciągać wnioski oraz formułować opinie. Potrafi wykorzystywać różne techniki do porozumiewania się w środowisku zawodowym i społecznym. Potrafi posługiwać się technikami informacyjno-komunikacyjnymi niezbędnymi

do realizacji działań typowych do działalności inżynierskiej. Wykorzystuje programy komputerowe do rozwiązywania zadań inżynierskich. Absolwent potrafi posługiwać się językiem obcym na poziomie B2 Europejskiego Systemu Opisu Kształcenia Językowego. Potrafi przygotować i przedstawić w języku polskim oraz języku obcym uznawanym za podstawowy, prezentację ustną dotyczącą szczegółowych zagadnień inżynierskich. Potrafi planować i przeprowadzać eksperymenty, interpretować uzyskane wyniki i formułować wnioski stosując metody analityczne i symulacyjne. Absolwent posiada przygotowanie niezbędne do pracy w przemyśle oraz zna zasady BHP. Potrafi posługiwać się aparaturą pomiarową posiadając przy tym umiejętność szacowania błędów i ocenić przydatność rutynowych metod i narzędzi służących do rozwiązania zadania inżynierskiego o charakterze praktycznym. Potrafi dostrzegać aspekty systemowe i pozatechniczne przy formułowaniu i rozwiązywaniu zadań inżynierskich. Absolwent potrafi dokonać krytycznej analizy sposobu funkcjonowania i ocenić istniejące rozwiązania techniczne stosowane w inżynierii środowiska oraz dokonywać wstępnej analizy ekonomicznej podejmowanych działań inżynierskich. Potrafi identyfikować i formułować zadania inżynierskie o charakterze praktycznym związane z inżynierią środowiska. Umie zrealizować proste zadania badawcze dotyczące szeroko rozumianych technologii ochrony środowiska i zgodnie z zadaną specyfikacją - zaprojektować oraz zrealizować urządzenie, obiekt, system lub proces typowy dla inżynierii środowiska.

Kompetencje społeczne:

Absolwent rozumie potrzebę dokształcania się oraz potrafi samodzielnie planować i realizować proces uczenia się przez całe życie, a także krytycznie oceniać posiadaną wiedzę. Ma poczucie odpowiedzialności za wyniki i skutki swojej aktywności zawodowej, szczególnie w kontekście jej wpływu na środowisko przyrodnicze. Prawidłowo identyfikuje problemy inżynierskie oraz potrafi określać priorytety działań zawodowych, a uznaje znaczenie wiedzy w rozwiązywaniu problemów poznawczych i praktycznych. Absolwent ma świadomość ważności postępowania profesjonalnego, przestrzegania zasad etyki zawodowej oraz poszanowania różnorodności poglądów i opinii, a także jest gotów do dbania o dorobek i tradycje zawodu inżyniera. Potrafi myśleć i działać w sposób kreatywny, innowacyjny i przedsiębiorczy oraz jest gotów do krytycznej oceny posiadanej wiedzy, współdziałać i pracując w grupie, przejmując w niej różne role; rozumie ważność działań zespołowych. Rozumie społeczną rolę inżyniera oraz rozumie potrzebę przekazywania społeczeństwu wiarygodnych informacji dotyczących osiągnięć inżynierskich.

Knowledge:

A graduate has extensive knowledge in selected fields of mathematics, physics, chemistry, biology and earth sciences to the extent necessary to describe phenomena and processes related to environmental engineering technologies. He/She has advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. A graduate knows the principles of engineering design, they knows the principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering. A graduate has advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering. A graduate has knowledge of electrical systems and thermodynamics, allowing for extensive understanding

of the principles of operation of machines and devices. They have specialist and systematic knowledge of the role of the natural environment, are aware of hazards and know how to identify and reduce them. A graduate has appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices. A graduate has knowledge of the potential of fossil fuels and renewable energy sources in Poland. They have advanced understanding of the economic and social role of the use of renewable energy sources. A graduate has knowledge in the observation of phenomena and processes that is appropriate for their studies and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental engineering. They have knowledge of the construction and operation of civil and municipal structures that is sufficient for engineering needs. A graduate has knowledge of geological, hydrological and climatic phenomena. They have advanced knowledge of the principles of rational energy, waste and wastewater management as well as heat transfer and energy conversion. A graduate has knowledge of the application of legal regulations, standards and guidelines in the design and operation of technical facilities. A graduate has the knowledge necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity. He/She knows and understands copyright and patent concepts and principles; knows and understands the fundamental dilemmas of modern civilisation. They have the knowledge of economics and management that is appropriate to their studies, including quality management, business operations and technology transfer. A graduate knows and understands foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages.

Skills:

A graduate has self-education skills, acquires information from literature, databases and other sources related to technical sciences. He/She is able to integrate obtained information, interpret it, draw conclusions and formulate opinions. A graduate is able to use various techniques to communicate in professional and social environments. He/She is able to use the information and communication technologies necessary to carry out typical engineering activities and use computer software to solve engineering tasks. A graduate is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages. He/She is able to prepare and make an oral presentation on specific engineering issues in Polish and foreign language recognised as a basic language. A graduate is able to plan and conduct experiments, interpret the obtained results and formulate conclusions using analytical and simulation methods. A graduate has the preparation necessary to work in industry and knows the rules of occupational safety and health. He/She is able to use measuring apparatus and has the ability to estimate errors and assess the suitability of routine methods and tools used to solve a practical engineering task. A graduate is able to see systemic and non-technical aspects while formulating and solving engineering tasks. A graduate is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in environmental engineering and conduct preliminary economic analysis for undertaken engineering activities. He/She is able to identify and formulate practical engineering tasks related to environmental engineering. A graduate is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of

environmental engineering in accordance with the provided specification.

Social competences:

A graduate understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge. He/She has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment. He/She correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems. A graduate is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession. He/She is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork. A graduate understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements.

Tabela kierunkowych efektów uczenia się

program studiów (kierunek studiów): **Environmental Engineering** poziom studiów: **Studia pierwszego stopnia** profil studiów: **Ogólnoakademicki**	
symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)
Wiedza: zna i rozumie	
IS_K1_W01	A student has extensive knowledge in selected fields of mathematics, physics, chemistry, biology and earth sciences to the extent necessary to describe phenomena and processes related to environmental engineering technologies
IS_K1_W02	A student has advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design
IS_K1_W03	A student knows the principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering
IS_K1_W04	A student has advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering
IS_K1_W05	A student has knowledge of electrical systems and thermodynamics, allowing for extensive understanding of the principles of operation of machines and devices
IS_K1_W06	A student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them
IS_K1_W07	A student has appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices
IS_K1_W08	A student has knowledge of the potential of fossil fuels and renewable energy sources in Poland. Student has advanced understanding of the economic and social role of the use of renewable energy sources
IS_K1_W09	A student has knowledge in the observation of phenomena and processes that is appropriate for their studies and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental engineering
IS_K1_W10	A student has knowledge of the construction and operation of civil and municipal structures that is sufficient for engineering needs
IS_K1_W11	A student has knowledge of geological, hydrological and climatic phenomena
IS_K1_W12	A student has advanced knowledge of the principles of rational energy, waste and wastewater management as well as heat transfer and energy conversion

IS_K1_W13	A student has knowledge of the application of legal regulations, standards and guidelines in the design and operation of technical facilities
IS_K1_W14	A student has the knowledge necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity
IS_K1_W15	A student knows and understands copyright and patent concepts and principles; knows and understands the fundamental dilemmas of modern civilisation
IS_K1_W16	A student has the knowledge of economics and management that is appropriate to their studies, including quality management, business operations and technology transfer
IS_K1_W17	A student knows and understands foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages
Umiejętności: potrafi	
IS_K1_U01	A student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions
IS_K1_U02	A student is able to use various techniques to communicate in professional and social environments. Student is able to use the information and communication technologies necessary to carry out typical engineering activities
IS_K1_U03	A student uses computer software to solve engineering tasks
IS_K1_U04	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages
IS_K1_U05	A student is able to prepare and make an oral presentation on specific engineering issues in Polish and foreign language recognised as a basic language
IS_K1_U06	A student is able to plan and conduct experiments, interpret the obtained results and formulate conclusions using analytical and simulation methods.
IS_K1_U07	A student has the preparation necessary to work in industry and knows the rules of occupational safety and health
IS_K1_U08	A student is able to use measuring apparatus and has the ability to estimate errors and assess the suitability of routine methods and tools used to solve a practical engineering task
IS_K1_U09	A student is able to see systemic and non-technical aspects while formulating and solving engineering tasks
IS_K1_U10	A student is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in environmental engineering and conduct preliminary economic analysis for undertaken engineering activities
IS_K1_U11	A student is able to identify and formulate practical engineering tasks related to environmental engineering

IS_K1_U12	A student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification
Kompetencje społeczne: jest gotów do	
IS_K1_K01	A student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge
IS_K1_K02	A student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment
IS_K1_K03	A student correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems
IS_K1_K04	A student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession
IS_K1_K05	A student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork
IS_K1_K06	A student understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements

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

program studiów (kierunek studiów): **Environmental 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		
IS_K1_W01	A student has extensive knowledge in selected fields of mathematics, physics, chemistry, biology and earth sciences to the extent necessary to describe phenomena and processes related to environmental engineering technologies	P6S_WG
IS_K1_W02	A student has advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design	P6S_WG
IS_K1_W03	A student knows the principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering	P6S_WG
IS_K1_W04	A student has advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering	P6S_WG
IS_K1_W05	A student has knowledge of electrical systems and thermodynamics, allowing for extensive understanding of the principles of operation of machines and devices	P6S_WG
IS_K1_W06	A student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them	P6S_WG
IS_K1_W07	A student has appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices	P6S_WG
IS_K1_W08	A student has knowledge of the potential of fossil fuels and renewable energy sources in Poland. Student has advanced understanding of the economic and social role of the use of renewable energy sources	P6S_WG
IS_K1_W09	A student has knowledge in the observation of phenomena and processes that is appropriate for their studies and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental engineering	P6S_WG
IS_K1_W10	A student has knowledge of the construction and operation of civil and municipal structures that is sufficient for engineering needs	P6S_WG

IS_K1_W11	A student has knowledge of geological, hydrological and climatic phenomena	P6S_WG
IS_K1_W12	A student has advanced knowledge of the principles of rational energy, waste and wastewater management as well as heat transfer and energy conversion	P6S_WG
IS_K1_W13	A student has knowledge of the application of legal regulations, standards and guidelines in the design and operation of technical facilities	P6S_WG
IS_K1_W14	A student has the knowledge necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity	P6S_WK3
IS_K1_W15	A student knows and understands copyright and patent concepts and principles; knows and understands the fundamental dilemmas of modern civilisation	P6S_WK1 P6S_WK2 P6S_WK3
IS_K1_W16	A student has the knowledge of economics and management that is appropriate to their studies, including quality management, business operations and technology transfer	P6S_WK3
IS_K1_W17	A student knows and understands foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	P6S_WG
Umiejętności: potrafi		
IS_K1_U01	A student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	P6S_UW
IS_K1_U02	A student is able to use various techniques to communicate in professional and social environments. Student is able to use the information and communication technologies necessary to carry out typical engineering activities	P6S_UK1 P6S_WG
IS_K1_U03	A student uses computer software to solve engineering tasks	P6S_UW
IS_K1_U04	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	P6S_UK3
IS_K1_U05	A student is able to prepare and make an oral presentation on specific engineering issues in Polish and foreign language recognised as a basic language	P6S_UK2 P6S_UK3
IS_K1_U06	A student is able to plan and conduct experiments, interpret the obtained results and formulate conclusions using analytical and simulation methods.	P6S_UO1 P6S_UU
IS_K1_U07	A student has the preparation necessary to work in industry and knows the rules of occupational safety and health	P6S_UW
IS_K1_U08	A student is able to use measuring apparatus and has the ability to estimate errors and assess the suitability of routine methods and tools used to solve a practical engineering task	P6S_UW
IS_K1_U09	A student is able to see systemic and non-technical aspects while formulating and solving engineering tasks	P6S_UO1 P6S_UW
IS_K1_U10	A student is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in environmental engineering and conduct preliminary economic analysis for undertaken engineering activities	P6S_UW

IS_K1_U11	A student is able to identify and formulate practical engineering tasks related to environmental engineering	P6S_UO2 P6S_UW
IS_K1_U12	A student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification	P6S_UW
Kompetencje społeczne: jest gotów do		
IS_K1_K01	A student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	P6S_KK2
IS_K1_K02	A student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	P6S_KO1 P6S_KO2
IS_K1_K03	A student correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems	P6S_KK1 P6S_KK2
IS_K1_K04	A student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession	P6S_KK2 P6S_KO1
IS_K1_K05	A student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	P6S_KK2 P6S_KO3
IS_K1_K06	A student understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements	P6S_KO1 P6S_KO2 P6S_KR

Uniwersalne charakterystyki poziomu 6 Polskiej Ramy Kwalifikacji zostały uwzględnione

Tabela pokrycia charakterystyk drugiego stopnia Polskiej Ramy Kwalifikacji przez kierunkowe efekty uczenia się

program studiów (kierunek studiów): **Environmental 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 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.	IS_K1_W01 IS_K1_W02 IS_K1_W03 IS_K1_W04 IS_K1_W05 IS_K1_W06 IS_K1_W07 IS_K1_W08 IS_K1_W09 IS_K1_W10 IS_K1_W11 IS_K1_W12 IS_K1_W13 IS_K1_W17
P6S_WK1	Zna i rozumie fundamentalne dylematy współczesnej cywilizacji.	IS_K1_W15
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.	IS_K1_W15
P6S_WK3	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form przedsiębiorczości.	IS_K1_W14 IS_K1_W15 IS_K1_W16
Umiejętności: potrafi		
P6S_UK1	Potrafi komunikować się z otoczeniem z użyciem specjalistycznej terminologii.	IS_K1_U02
P6S_UK2	Potrafi brać udział w debacie – przedstawiać i oceniać różne opinie i stanowiska oraz dyskutować o nich.	IS_K1_U05
P6S_UK3	Potrafi posługiwać się językiem obcym na poziomie B2 Europejskiego Systemu Opisu Kształcenia Językowego.	IS_K1_U04 IS_K1_U05
P6S_UO1	Potrafi planować i organizować pracę indywidualną oraz w zespole.	IS_K1_U06 IS_K1_U09
P6S_UO2	Potrafi współdziałać z innymi osobami w ramach prac zespołowych (także o charakterze interdyscyplinarnym).	IS_K1_U11
P6S_UU	Potrafi samodzielnie planować i realizować własne uczenie się przez całe życie.	IS_K1_U06

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.	IS_K1_U01 IS_K1_U03 IS_K1_U07 IS_K1_U08 IS_K1_U09 IS_K1_U10 IS_K1_U11 IS_K1_U12
Kompetencje społeczne: jest gotów do		
P6S_KK1	Jest gotów do krytycznej oceny posiadanej wiedzy i odbieranych treści.	IS_K1_K03
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.	IS_K1_K01 IS_K1_K03 IS_K1_K04 IS_K1_K05
P6S_KO1	Jest gotów do wypełniania zobowiązań społecznych, współorganizowania działalności na rzecz środowiska społecznego.	IS_K1_K02 IS_K1_K04 IS_K1_K06
P6S_KO2	Jest gotów do inicjowania działań na rzecz interesu publicznego.	IS_K1_K02 IS_K1_K06
P6S_KO3	Jest gotów do myślenia i działania w sposób przedsiębiorczy.	IS_K1_K05
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.	IS_K1_K06

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

program studiów (kierunek studiów): **Environmental 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		
IS_K1_W01	A student has extensive knowledge in selected fields of mathematics, physics, chemistry, biology and earth sciences to the extent necessary to describe phenomena and processes related to environmental engineering technologies	
IS_K1_W02	A student has advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design	
IS_K1_W03	A student knows the principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering	
IS_K1_W04	A student has advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering	
IS_K1_W05	A student has knowledge of electrical systems and thermodynamics, allowing for extensive understanding of the principles of operation of machines and devices	
IS_K1_W06	A student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them	
IS_K1_W07	A student has appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices	
IS_K1_W08	A student has knowledge of the potential of fossil fuels and renewable energy sources in Poland. Student has advanced understanding of the economic and social role of the use of renewable energy sources	
IS_K1_W09	A student has knowledge in the observation of phenomena and processes that is appropriate for their studies and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental engineering	
IS_K1_W10	A student has knowledge of the construction and operation of civil and municipal structures that is sufficient for engineering needs	P6S_WG

IS_K1_W11	A student has knowledge of geological, hydrological and climatic phenomena	
IS_K1_W12	A student has advanced knowledge of the principles of rational energy, waste and wastewater management as well as heat transfer and energy conversion	
IS_K1_W13	A student has knowledge of the application of legal regulations, standards and guidelines in the design and operation of technical facilities	P6S_WG
IS_K1_W14	A student has the knowledge necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity	P6S_WK
IS_K1_W15	A student knows and understands copyright and patent concepts and principles; knows and understands the fundamental dilemmas of modern civilisation	P6S_WK
IS_K1_W16	A student has the knowledge of economics and management that is appropriate to their studies, including quality management, business operations and technology transfer	P6S_WK
IS_K1_W17	A student knows and understands foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	
Umiejętności: potrafi		
IS_K1_U01	A student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	
IS_K1_U02	A student is able to use various techniques to communicate in professional and social environments. Student is able to use the information and communication technologies necessary to carry out typical engineering activities	
IS_K1_U03	A student uses computer software to solve engineering tasks	
IS_K1_U04	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	
IS_K1_U05	A student is able to prepare and make an oral presentation on specific engineering issues in Polish and foreign language recognised as a basic language	
IS_K1_U06	A student is able to plan and conduct experiments, interpret the obtained results and formulate conclusions using analytical and simulation methods.	P6S_UW1
IS_K1_U07	A student has the preparation necessary to work in industry and knows the rules of occupational safety and health	
IS_K1_U08	A student is able to use measuring apparatus and has the ability to estimate errors and assess the suitability of routine methods and tools used to solve a practical engineering task	
IS_K1_U09	A student is able to see systemic and non-technical aspects while formulating and solving engineering tasks	
IS_K1_U10	A student is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in environmental engineering and conduct preliminary economic analysis for undertaken engineering activities	P6S_UW2 P6S_UW3

IS_K1_U11	A student is able to identify and formulate practical engineering tasks related to environmental engineering	
IS_K1_U12	A student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification	P6S_UW1 P6S_UW4
Kompetencje społeczne: jest gotów do		
IS_K1_K01	A student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	
IS_K1_K02	A student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	
IS_K1_K03	A student correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems	
IS_K1_K04	A student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession	
IS_K1_K05	A student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	
IS_K1_K06	A student understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements	

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

program studiów (kierunek studiów): **Environmental 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.	IS_K1_W10 IS_K1_W13
P6S_WK	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form indywidualnej przedsiębiorczości.	IS_K1_W14 IS_K1_W15 IS_K1_W16
Umiejętności: potrafi		
P6S_UW1	Potrafi planować i przeprowadzać eksperymenty, w tym pomiary i symulacje komputerowe, interpretować uzyskane wyniki i wyciągać wnioski.	IS_K1_U06 IS_K1_U12
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.	IS_K1_U10
P6S_UW3	Potrafi dokonywać krytycznej analizy sposobu funkcjonowania istniejących rozwiązań technicznych i oceniać ich rozwiązania.	IS_K1_U10
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.	IS_K1_U12

Wydział Mechaniczny

POLITECHNIKA OPOLSKA

Plan studiów
Study plan

Kierunek studiów – Field of study

- ENVIRONMENTAL ENGINEERING

- INŻYNIERIA ŚRODOWISKA

Studia stacjonarne
pierwszego stopnia

First Cycle Programme – Full-Time Studies

CHARAKTERYSTYKA OGÓLNA

kierunek studiów: ENVIRONMENTAL ENGINEERING

profil: OGÓLNOAKADEMICKI

nazwa wydziału: WYDZIAŁ MECHANICZNY

plan studiów	uchwała Senatu PO z dnia	nr 409 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 MECHANICZNY	OPOLE UNIVERSITY OF TECHNOLOGY FACULTY OF MECHANICAL ENGINEERING
Kierunek studiów:	**Field of study:**
ENVIRONMENTAL ENGINEERING	**INŻYNIERIA ŚRODOWISKA**
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 Subject unit – semester curricular	W (Lecture)	C (Practical classes)	L (Laboratory classes)	P (Project)	S (Seminar)		
1.1	General Mathematics Matematyka ogólna	30E	30	-	-	-	5	P
1.2	Materials science Materiałoznawstwo	30	-	-	-	-	2	P
1.3	General Physics Fizyka ogólna	15	-	-	-	-	1	P
1.4	General chemistry Chemia ogólna	15	15	-	-	-	3	P
1.5	Environmental biology and basics of ecology Biologia środowiska z podstawami ekologii	15	-	15	-	-	3	P
1.6	Descriptive geometry Geometria wykreślna	15	30	-	-	-	4	P
1.7	Ergonomics and industrial safety and hygiene Ergonomia oraz bezpieczeństwo i higiena pracy	15	-	-	-	-	1	K
1.8	Protection of intelectual property Ochrona własności intelektualnej	30	-	-	-	-	2	HS
1.9	Energy production techniques Techniki pozyskiwania energii	45E	-	-	-	-	4	K
1.10	Technologies and industrial apparatus Technologie i urządzenia przemysłowe	30	-	-	-	-	2	K
1.11	Technical metrology Metrologia techniczna	15	15	-	-	-	3	K
Liczba godzin w semestrze (Number of hours in a semester)		255	90	15	-	-	30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		360						

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	Mathematics for engineers Matematyka dla inżynierów	15E	15	-	-	-	3	P
2.2	Mechanics Mechanika ogólna	15	15	-	-	-	3	P
2.3	Physics for engineers Fizyka dla inżynierów	15E	-	30	-	-	4	P
2.4	Chemistry for engineers Chemia dla inżynierów	30E	15	15	-	-	5	P
2.5	Basics of technical drawing Podstawy rysunku technicznego	15	30	-	-	-	4	P
2.6	Information technology Technologie informacyjne	15	-	15	-	-	2	P
2.7	Elements of informatics and foundations of programming Elementy informatyki i podstawy programowania	30	-	30	-	-	5	P
Przedmioty humanistyczne lub społeczne wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							4	
2.8	Elective module - II: Economics in micro-business Moduł wybieralny - II: Ekonomia w mikrobiznesie	30	-	-	-	-	(2)	W-HS
	Elective module - II: History of science Moduł wybieralny - II: Historia nauki	30	-	-	-	-	(2)	W-HS
2.9	Elective module - I: Basis of personal development Moduł wybieralny - I: Podstawy rozwoju osobistego	30	-	-	-	-	(2)	W-HS
	Elective module - I: Social Communication Moduł wybieralny - I: Komunikacja społeczna	30	-	-	-	-	(2)	W-HS
Liczba godzin w semestrze (Number of hours in a semester)		195	165				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		360						

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	Differential and integral calculus Rachunek różniczkowy i całkowy	15	15	-	-	-	3	P
3.2	Strength of materials Wytrzymałość materiałów	15	15	15	-	-	4	P
3.3	Basic Biotechnology Podstawy biotechnologii i biotechniki	15E	15	-	-	-	3	P
3.4	Computer Aided Design Komputerowe wspomaganie projektowania	15	-	15	-	-	3	P
3.5	Technical thermodynamics Termodynamika techniczna	30E	30	15	-	-	5	P
3.6	Sanitary Chemistry Chemia sanitarna	30E	15	15	-	-	4	K
3.7	Environmental metrology Metrologia środowiska	15	-	30	-	-	3	K
3.8	Engineering drawing with CAD I Zapis konstrukcji z wykorzystaniem CAD I	-	-	15	-	-	1	K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
3.9	Physical education Wychowanie fizyczne	-	30	-	-	-	(0)	W
3.10	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)							2	
3.11	Computer control techniques Komputerowe techniki sterowania	15	-	15	-	-	(2)	W-K
	Computer measurement techniques Komputerowe techniki pomiarów	15	-	15	-	-	(2)	W-K
Liczba godzin w semestrze (Number of hours in a semester)		150	270				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		420						

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	Fluid mechanics Mechanika płynów	30E	30	15	-	-	5	P
4.2	Engineering drawing with CAD II Zapis konstrukcji z wykorzystaniem CAD II	-	-	15	-	-	1	K
4.3	Electrical engineering Inżynieria elektryczna	15	15	-	-	-	2	K
4.4	Gas system design Projektowanie instalacji gazowych	15	-	-	30	-	3	K
4.5	Circular economy Gospodarka obiegu zamkniętego	15E	-	-	15	-	2	K
4.6	Buildings structures Konstrukcje budowlane	30E	-	-	30	-	5	K
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							10	
4.7	Energy management in industry Gospodarowanie energią w przemyśle	30E	15	-	30	-	(6)	W-K
	Municipal energy management Komunalna gospodarka energetyczna	30E	15	-	30	-	(6)	W-K
4.8	Mechanical operations in industrial installations Operacje mechaniczne w instalacjach przemysłowych	30	15	15	15	-	(4)	W-K
	Mechanical operations in sanitary installations Operacje mechaniczne w instalacjach sanitarnych	30	15	15	15	-	(4)	W-K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
4.9	Foreign language Język obcy	-	-	30	-	-	(2)	W
	Foreign language Język obcy	-	-	30	-	-	(2)	W
4.10	Physical education Wychowanie fizyczne	-	30	-	-	-	(0)	W
Liczba godzin w semestrze (Number of hours in a semester)		165	300				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		465						

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	Environmental protection Ochrona środowiska	30	-	-	-	-	2	P
5.2	Air protection Ochrona powietrza	15	-	15	-	-	2	K
5.3	Engineering drawing with CAD III Zapis konstrukcji z wykorzystaniem CAD III	-	-	15	-	-	1	K
5.4	Water Technology Technologia wody	15E	-	30	-	-	3	K
5.5	Waste management Gospodarka odpadami	30E	15	-	-	-	3	K
5.6	Hydrology, meteorology and climatology Hydrologia, meteorologia i klimatologia	30E	-	-	15	-	3	K
5.7	Geotechnics and soil mechanics Geotechnika i mechanika gruntów	15	-	-	-	-	1	K
5.8	Geodesy with geographic information elements Geodezja z elementami informacji przestrzennej	15	-	15	15	-	3	K
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							4	
5.9	Thermal and diffusion processes in industrial installations Procesy cieplne i dyfuzyjne w instalacjach przemysłowych	15E	15	-	15	-	(4)	W-K
	Thermal and diffusion processes in sanitary installations Procesy cieplne i dyfuzyjne w instalacjach sanitarnych	15E	15	-	15	-	(4)	W-K
Praktyka – wymagana liczba p. ECTS w semestrze (Practice – compulsory ECTS in a semester)							6	
5.10	Professional practice Praktyka zawodowa	-	-	-	160	-	(6)	W-PR
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
5.11	Foreign language Język obcy	-	-	30	-	-	(2)	W
	Foreign language Język obcy	-	-	30	-	-	(2)	W
Liczba godzin w semestrze (Number of hours in a semester)		165	340				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		505						

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	Engineering drawing with CAD IV Zapis konstrukcji z wykorzystaniem CAD IV	-	-	15	-	-	1	K
6.2	Wastewater technology Technologia ścieków	15E	-	30	-	-	2	K
6.3	Heating, ventilation and air - conditioning Ogrzewnictwo, wentylacja i klimatyzacja	15	-	-	30	-	2	K
6.4	Water system design Projektowanie instalacji wodnych	15E	-	-	30	-	3	K
6.5	Design of sewage installation Projektowanie instalacji ściekowych	15E	-	-	30	-	3	K
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							17	
6.6	Industry water management Gospodarka wodna w przemyśle	30	-	-	15	-	(3)	W-K
	Water management and water protection Gospodarka wodna i ochrona wód	30	-	-	15	-	(3)	W-K
6.7	Energetic efficiency of industrial processes Energochłonność procesów przemysłowych	30	15	-	15	-	(3)	W-K
	Energetic efficiency of municipal facilities Energochłonność obiektów komunalnych	30	15	-	15	-	(3)	W-K
6.8	Impact assessment of the enterprises on the environment Ocena oddziaływania przedsiębiorstw na środowisko	30	-	-	30	-	(4)	W-K
	Methods of the impact of industry on the environment Metody oceny oddziaływania przemysłu na środowisko	30	-	-	30	-	(4)	W-K
6.9	Design work - the environmental area Praca przejściowa - obszar środowiskowy	-	-	-	30	-	(2)	W-K
	Design work - the industrial area Praca przejściowa - obszar przemysłowy	-	-	-	30	-	(2)	W-K
6.10	Diploma work (engineering project) Praca dyplomowa (Projekt inżynierski)	godziny niekontaktowe (un-contact hours)					(5)	W-K
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
6.11	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)		150	270				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		420						

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	Costing Kosztorysowanie	15	-	-	15	-	3	K
7.2	Engineering drawing with CAD V Zapis konstrukcji z wykorzystaniem CAD V	-	-	15	-	-	1	K
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							25	
7.3	Environmental monitoring Monitoring środowiska	15	-	15	-	-	(2)	W-K
	Industrial pollutions Zanieczyszczenia przemysłowe	15	-	15	-	-	(2)	W-K
7.4	Assessment of the nuisance of selected processes Ocena uciążliwości wybranych procesów	15	-	-	15	-	(2)	W-K
	Environmental hazards in industrial processes Środowiskowe zagrożenia w procesach przemysłowych	15	-	-	15	-	(2)	W-K
7.5	Excavation works Ziemne roboty instalacyjne	30	-	-	15	-	(4)	W-K
	Underground infrastructure Infrastruktura podziemna	30	-	-	15	-	(4)	W-K
7.6	Municipal recycling Recykling w gospodarce komunalnej	30	15	-	-	-	(4)	W-K
	Vehicle recycling Recykling w motoryzacji	30	15	-	-	-	(4)	W-K
7.7	Final seminary - the environmental area Seminarium dyplomowe - obszar środowiskowy	-	-	-	-	30	(3)	W-K
	Final seminary - the industrial area Seminarium dyplomowe - obszar przemysłowy	-	-	-	-	30	(3)	W-K
7.8	Diploma work (engineering project) Praca dyplomowa (Projekt inżynierski)	E -godziny niekontaktowe (un-contact hours)					(10)	W-K
Przedmioty humanistyczne lub społeczne wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							1	
7.9	Elective module - III: Law and standards in environmental protection Moduł wybieralny - III: Prawo i normy w ochronie środowiska	15	-	-	-	-	(1)	W-HS
	Elective module - III: Social responsibility for environmental protection Moduł wybieralny - III: Społeczna odpowiedzialność w ochronie środowiska	15	-	-	-	-	(1)	W-HS
Liczba godzin w semestrze (Number of hours in a semester)		120	120				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		240						

PLAN STUDIÓW RAZEM (TOTAL STUDY PLAN)		ECTS
Łącznie godzin kontaktowych/ECTS w planie studiów	**2770**	**210**
Total contact hours/ECTS in study plan		

STATYSTYKA PROGRAMU STUDIÓW			
Typ	**Przedmioty - p. ECTS razem**	**wg planu**	**udział**
HS	Humanistyczne lub społeczne	2	0.95 %
K	Kierunkowe	62	29.52 %
P	Podstawowe	69	32.86 %
W	Wybieralne	8	3.81 %
W-HS	Humanistyczne lub społeczne, wybieralne	5	2.38 %
W-K	Wybieralne kierunkowe	58	27.62 %
W-PR	Praktyki	6	2.86 %
	Łącznie:	210	100.00 %

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

Politechnika Opolska
Wydział Mechaniczny
Opole 2024 r.

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Air protection
Nazwa przedmiotu	Ochrona powietrza

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

Course code	D.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Understanding of basic physical and chemical laws
		2	Understanding of the fundamentals of ecology including environmental phenomena and interactions
	Skills	1	Distinguish between basic physical and chemical processes occurring in nature
		2	Description of physical and chemical phenomena and processes occurring in nature
	Social Competence	1	Ability to verify the information received
		2	Ability to discuss, analyse and construct conclusions
		3	Ability to conduct practical experiments

Course Goals The aim is to familiarise Students with the problems of protecting one of the most important components of the environment. The course imparts knowledge on the formal, legal and technical requirements for monitoring and maintaining indicative aerosanitary parameters. In addition, Students are practically acquainted with ways of controlling atmospheric air quality.

Programme content The course provides knowledge on issues related to counteracting local and global changes in the atmosphere caused by anthropogenic activities. Within the framework of the module, students acquire knowledge on the characteristics of pollutants and their sources, legal guidelines for limiting emissions of substances and energy, and maintaining the satisfactory quality of the troposphere, as well as methods of collecting information on emissions, immission and deposition of pollutants. The subject also serves to familiarise Students with practical methods of measuring selected indicator pollutants. The acquired knowledge allows Students to identify hazards causing degradation of aerosanitary parameters, and enables them to understand and practically apply lawful methods and techniques to counteract these hazards.

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 a structured knowledge of the role of the atmosphere; student is aware of the threats and knows the methods of identifying and reducing them	IS_K1_W01	W L	C H J
	2	Students have adequate knowledge of observation of phenomena and processes and know the basic methods to perform measurements of characteristic quantities relevant to air protection	IS_K1_W02	W L	C H J
Skills	1	Student is able to use measurement equipment with the ability to estimate errors and assess the suitability of routine methods and tools for air quality monitoring.	IS_K1_U08	W L	C H J
	2	Students are able to observe phenomena and processes and are able to carry out measurements of characteristic physical, chemical and biological quantities relevant to environmental engineering as part of an experiment and to interpret the results obtained	IS_K1_U06	W L	C H J
Social Competence	1	Student understands the need for further education, improvement of professional competence	IS_K1_K01	W L	C H J
	2	Student has a sense of responsibility for the results and consequences of his/her professional activity, especially in the context of its impact on the natural environment	IS_K1_K02	W L	C H 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. Olszowski Tomasz
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	6
Preparation of a report/paper/ project/presentation	8
Independent study of the course topics	16
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 hab. inż. Kłosok-Bazan Iwona
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Assessment of the nuisance of selected processes
Nazwa przedmiotu	Ocena uciążliwości wybranych procesów

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

Course code	E.6.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student knows the components of the environment and the interdependencies between them.
		2	A student has basic knowledge of technology and devices industrial.
	Skills	1	A student is able to assess the risk of individual components industrial processes.
		2	
	Social Competence	1	A student has a sense of social importance of the engineer's role.
		2	

Course Goals The aim of the course is to familiarize students with the concepts related to the environmental nuisance of selected industrial processes

Programme content The subject provides knowledge on issues related to the assessment of the burdensomeness of selected processes. During the module, the student acquires knowledge and skills in the field of assessment and analysis of the harmfulness of industrial processes at the design stage, process approval and use. Acquired knowledge in the field of identifying sources of ecological threats and ecological nuisance in industrial processes allows determining the degree of harmfulness of an industrial process for various branches of the economy, with particular emphasis on the energy industry.

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 principles of identification of hazards in environmental engineering	IS_K1_W03	W P	C K L R
	2	Student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards in selected proecesses and knows how to identify and reduce them	IS_K1_W06	W P	C K L R
Skills	1	Student is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in industrial processes	IS_K1_U10	P	K L R
	2	Student is able to design system or process typical for environmental engineering	IS_K1_U12	P	K L R
Social Competence	1	Student correctly identifies engineering problems	IS_K1_K03	W P	C K L R
	2	Student is able to think and act in a creative way	IS_K1_K05	P	K L 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. Guziałowska-Tic Joanna
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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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third
Course Title	Basic Biotechnology

Nazwa przedmiotu	Podstawy biotechnologii i biotechniki		
ECTS points	3	Subject type	P
Language of lecture	angielski	Mode of completing the course	Examination
Course code	A.12.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Basic knowledge in the field of mathematical- natural sciences and technical sciences.
		2	Basic knowledge of biology and chemistry.
	Skills	1	Student is able to obtain information from literature, databases and other sources related to technical sciences.
		2	Student is able to perform simple chemical calculations.
	Social Competence	1	Student understands the need for further education and enhancing qualifications
		2	The student demonstrates communication and team cooperation skills.

Course Goals 1. The aim of the course is to familiarize students with the current state of knowledge, the latest achievements in the field of biotechnology and the prospects for development perspectives of this field of science. 2. Discussion of the applide nature of scientific research and the latest implementations in the field of plant and animal biotechnology , industrial biotechnology, medical and environmental biotechnology. 3. The student acquires and develops competences in the technical aspects of implementing biotechnological processes and technologies for producing selected bioproducts.

Programme content The course covers topics related to the latest advancements and current state of knowledge in the field of biotechnology. Students gain knowledge concerning the objectives of scientific research and the newest applications in plant and animal biotechnology, industrial biotechnology, medical biotechnology, and environmental biotechnology, along with their impact on the modern economy and human life. Furthermore, students gain and improve competencies in the technical aspects of implementing biotechnological processes and technologies for the production of specific bioproducts. As part of the course, students also gain knowledge and skills in biotechnology calculations.

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 selected fields of biology and biotechnology to the extent necessary to describe phenomena and technological processes related to production of bioproducts and realisation of selected environmental engineering technologies.	IS_K1_W01	W C	A C
	2	A student knows the importance of the development of biotechnology for the modern economy, human life and environmental protection.	IS_K1_W12	W C	A C
	3	A student knows the principles of identification of hazards and occupational health, safety connect with construction and operation of installations used in biotechnology production processes.	IS_K1_W03	W C	A C
Skills	1	The student has self-education skills. The student is able to obtain information from literature and other sources to perform biotechnology calculations. The student is able to integrate the obtained information, interpret it, as well as draw conclusions and formulate opinions on the implemented biotechnological processes.	IS_K1_U01	C	C
	2	The student is able to identify and formulate practical engineering tasks related to biotechnology calculations or calculations of bioreactor components.	IS_K1_U11	C	C
	3	The student is able to perform simple research tasks on a wide range of environmental technologies related to the use of microorganisms, the implementation of biotechnological processes, as well as describe typical equipment and operating parameters of these devices.	IS_K1_U12	C	C

Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge particularly within the field of biotechnology and bioprocess engineering.	IS_K1_K01	W C	A C
	2	Student correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems in biotechnology and bioprocess engineering.	IS_K1_K03	W C	A C
	3	The student demonstrates proficiency in creative and innovative thinking, along with a readiness to critically evaluate their own knowledge within the domains of biotechnology and bioprocess engineering. Additionally, they exhibit the ability to collaborate effectively within a team, adeptly assuming various roles in aim to resolve tasks.	IS_K1_K05	C	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. Płaczek Małgorzata
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	20
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	25
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

dr hab. inż. Hapanowicz Jerzy
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Basics of technical drawing
Nazwa przedmiotu	Podstawy rysunku technicznego

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

Course code	A.6.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student has detailed knowledge in the field of methods for projecting complex spatial objects.
		2	A student has knowledge in constructing projections of spatial objects on the drawing plane.
		3	A student is familiar with methods for determining relationships between spatial objects.
	Skills	1	A student has the ability to solve problems in solid geometry.
		2	A student has practical skill in aesthetically drawing using traditional methods.
		3	A student has practical ability to solve problems in solid geometry regarding recording of design features of objects.
	Social Competence	1	Student correctly identifies and resolves relationships between complex spatial objects
		2	Student can record and communicate information about spatial objects
		3	Student can think and act in an entrepreneurial way

Course Goals The aim of the subject is to familiarize students with the principles of technical documentation

Programme content Discussion of requirements for engineering graphics, orthogonal projection, principles of standardization in technical drawing, dimensioning rules and arrangement of dimensions. Application in drawing typical machine elements used in environmental engineering.

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 an advanced knowledge of engineering graphics to present complex devices and industrial equipment	IS_K1_W04	W C	C F G I P R
	2	Student knows the scope of standardization and requirements for construction documentation to an advanced degree	IS_K1_W04	W C	C F G I P R
Skills	1	Student can make a simple technical drawing of a machine element, mechanism and industrial apparatus	IS_K1_U02	W C	C F G I P R
	2	Student can formulate a specification of engineering tasks of a practical nature	IS_K1_U11	W C	C F G I P R
Social Competence	1	Student can interact and work in a group	IS_K1_K05	W C	C F G I P R
	2	Student is aware of the importance and reliability of engineering activities	IS_K1_K02	W C	C F G 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. Kowalski Mateusz
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	23
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	100
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Buildings structures
Nazwa przedmiotu	Konstrukcje budowlane

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

Course code	D.7.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has general knowledge of materials and raw materials used in construction
		2	
	Skills	1	A student is able to identify the relationships between the use of materials and the durability of the structure
		2	
	Social Competence	1	A student is able to identify the relationships between the use of materials and the durability of the structure
		2	

Course Goals Familiarizing students with the basic materials used in construction. Developing the ability to recognize building components. Providing knowledge about the principles of using ecological materials in building structures.

Programme content The subject provides knowledge on issues related to the use of materials in engineering structures. During the module, the student acquires knowledge and skills in recognizing construction elements and the possibilities of using building materials in them. Acquires knowledge of building materials produced based on the principles of sustainable development and circular economy.

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 about the construction of buildings sufficient for engineering needs.	IS_K1_W10	W P	A K L
	2	Student understands and knows the multi-faceted conditions of engineering activities.	IS_K1_W14	W P	A K L
Skills	1	Student can make a simple construction project.	IS_K1_U02	P	K L
	2	Student perceives and analyzes various issues in solving engineering tasks.	IS_K1_U09	P	K L
Social Competence	1	Student has a need for further education.	IS_K1_K01	W P	A K L
	2	Student correctly defines priorities in engineering activities.	IS_K1_K03	W P	A K L

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. Król 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	10
Preparation of a report/paper/ project/presentation	25
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

dr hab. inż. Hapanowicz Jerzy
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Chemistry for engineers
Nazwa przedmiotu	Chemia dla inżynierów

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

Course code	A.3.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Basic knowledge in the field of inorganic chemistry.
		2	
	Skills	1	Ability to use professional literature.
		2	
	Social Competence	1	A student understands the need for continuous training.
		2	

Course Goals The aim of the course is to familiarize students with the basic issues, calculations and reactions from organic chemistry.

Programme content The subject provides knowledge on basic issues in organic chemistry. During the module, the student acquires knowledge and skills, among others, in the field of nomenclature and classification of organic chemical compounds, characteristics of selected groups of compounds, including the group of saturated and unsaturated hydrocarbons, reactivity of organic chemical compounds and their applications. The acquired knowledge of basic issues in organic chemistry allows you to determine the basic properties of organic chemical compounds that occur in the water, soil and atmosphere 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 extensive knowledge in organic chemistry to the extent necessary to describe phenomena and processes related to environmental engineering technologies	IS_K1_W01	W C L	A C F H I J
	2				
Skills	1	Student is able to plan and conduct experiments, interpret the obtained results and formulate conclusions	IS_K1_U06	L	F H
	2	Student is able to identify and formulate practical engineering tasks in organic chemistry related to environmental engineering	IS_K1_U11	C	C I J
Social Competence	1	Student understands the need to learn	IS_K1_K01	W C L	A C F
	2	Student is able to think and act in a creative way	IS_K1_K05	L	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. Guziałowska-Tic Joanna
Calculation class (C)	15	
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)	15
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	30
Preparation of a report/paper/ project/presentation	17
Independent study of the course topics	17
Examination or final colloquium	1
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth
Course Title	Circular economy
Nazwa przedmiotu	Gospodarka obiegu zamkniętego

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

Course code	D.6.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	A student understands the need for continuous training
		2	

Course Goals The aim of the course is to familiarize students with the basic issues of restructuring of devastated areas

Programme content The functioning of the circular economy as a solution to certain environmental problems, and a discussion of issues related to monitoring of the circular economy contained in four aspects: production and consumption, waste management, secondary raw materials and competitiveness and innovation.

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 principles of identification of hazards in environmental engineering	IS_K1_W03	W P	A K L R
	2	Student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them in the area of restructuring of devastated areas	IS_K1_W06	W P	A K L P
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to restructuring of devasted areas	IS_K1_U01	W	A
	2	Student is able to design system or process typical of environmental engineering	IS_K1_U12	P	K L R
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment and environmental devastation	IS_K1_K02	W P	A K L R
	2	Student is able to think and act in a creative way	IS_K1_K05	P	K L 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. Kłosok-Bazan Iwona
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	6
Independent study of the course topics	0
Examination or final colloquium	4
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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
Nazwa przedmiotu	Komputerowe wspomaganie projektowania

ECTS points	3	Subject type	P

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	A.7.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Understanding of Technical Drawing Principles: Familiarity with technical drawing principles, including geometric shapes, projections, dimensioning, and tolerancing, is beneficial.
		2	Mathematics and Geometry Knowledge: A solid understanding of mathematics, particularly geometry, is important for CAD work. Concepts such as angles, measurements, and geometric transformations are frequently used.
	Skills	1	Spatial Visualization Skills: Strong spatial visualization skills are advantageous for understanding three-dimensional objects and their representations.
		2	Proficiency in CAD Software (Optional): While not mandatory for beginners, familiarity with CAD software such as AutoCAD, SolidWorks, or CATIA can be helpful. However, introductory courses often assume no prior experience with specific CAD tools.
		3	Problem-Solving Skills: The ability to solve complex problems and think critically is important for troubleshooting issues that may arise during the CAD design process.
	Social Competence	1	A student understands the need to learn and gather knowledge
		2	A student is adapted to work both individually and in a team

Course Goals The aim of the course is to practice the basics and extend the skills of correct solid modeling in the 3D CAD system. Students learn how to design individual parts, perform presentations, technical documentation, and teams.

Programme content Introduction to CAD Principles: Understanding the fundamental concepts and principles of Computer Aided Design, including software interface navigation, basic drawing commands, and file management. 2D Drafting and Design: Learning to create and modify 2D drawings using CAD software, including techniques for drawing lines, circles, arcs, and text, as well as dimensioning and annotation 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 an advanced knowledge of methods, techniques, tools used to solve simple engineering tasks in the field of three-dimensional modeling, preparation of technical documentation	IS_K1_W02	W L	C D H
	2				
Skills	1	A student uses computer software to solve engineering tasks in environmental engineering	IS_K1_U03	L	H P
	2				
Social Competence	1	A student understands the need to learn throughout life; can inspire and organize the learning process of other people	IS_K1_K01	W L	C D 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. Pochwała Sławomir
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	30
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	4

Examination or final colloquium	1
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 Mechanical Engineering
Course Description Card

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

Course Title	Computer control techniques
Nazwa przedmiotu	Komputerowe techniki sterowania

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

Course code	E.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge in the field of electrical engineering
		2	Basics of measuring typical physical quantities
	Skills	1	Computer operation
		2	
	Social Competence	1	Ability to work in a group
		2	

Course Goals To acquaint students with basic knowledge in the field of modern control techniques.

Programme content Acquire knowledge about computer control techniques and system which consists of a high-reliability computer, various control modules with reliable properties, and various sensors, which is equipped with a software control 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 knows the structure of typical control systems to an advanced degree	IS_K1_W02	W L	C D H
	2	A student knowledge of the principles of selection of electrical systems	IS_K1_W05	W L	C D H O
	3	A student knows the typical control systems to an advanced degree	IS_K1_W02	W L	D H
Skills	1	The ability to select the settings of typical regulators	IS_K1_U06	L	C D H
	2				
Social Competence	1	A student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	IS_K1_K05	L	H 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 inż. Łukasiewicz 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)	15
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	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

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third
Course Title	Computer measurement techniques
Nazwa przedmiotu	Komputerowe techniki pomiarów

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

Course code	E.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basics of measuring typical physical quantities
		2	Knowledge of typical industrial processes
	Skills	1	Computer operation
		2	
	Social Competence	1	Ability to work in a group
		2	

Course Goals	To acquaint students with basic knowledge on modern measurement techniques.

Programme content Acquire knowledge about computer supported measurement techniques used to communicate with measurement equipment to automate a measurement.

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 construction of computer measuring systems to an advanced degree	IS_K1_W02	W	C D O
	2	A student knows the rules of selecting the measuring apparatus to an advanced degree	IS_K1_W02	W L	C D H O
	3	A student knows advanced solutions of measurement systems to an advanced degree	IS_K1_W02	L	H
Skills	1	Using virtual measuring instruments	IS_K1_U03	L	H
	2	Using computer measuring systems	IS_K1_U03	L	H
Social Competence	1	Teamwork	IS_K1_K05	L	H 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 inż. Łukasiewicz 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)	15
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	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

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Costing
Nazwa przedmiotu	Kosztorysowanie

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

Course code	D.10.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student provides knowledge on designing processes and technological installations related to environmental engineering.
		2	
	Skills	1	A student cultivates creative skills.
		2	
	Social Competence	1	Students can act creatively.
		2	

Course Goals The aim of the course is to prepare students for preparing cost estimates in environmental engineering.

Programme content Within the course, knowledge is conveyed regarding cost estimation, particularly in environmental engineering, the principles of their execution, and best practices applicable in this area of engineering activity. The acquired knowledge will enable students to develop skills in preparing both general and specialized cost estimates. The acquired social competencies will allow for reinforcing the importance of a proper approach to carrying out engineering tasks, with particular emphasis on their economic aspects.

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 of the application of legal regulations, standards and guidelines in the design and operation of technical facilities.	IS_K1_W13	W	C
	2	Student has advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design	IS_K1_W02	P	L M
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	IS_K1_U01	P	L M
	2	Student uses computer software to solve engineering tasks	IS_K1_U03	P	L M
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	W	C
	2	Student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession	IS_K1_K04	P	L M 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. Szmolke Norbert
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	19
Independent study of the course topics	15
Examination or final colloquium	1
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First
Course Title	Descriptive geometry
Nazwa przedmiotu	Geometria wykreślna

ECTS points	4	Subject type	P

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	A.6.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A sudent knows the geometry of high school.
		2	A sudent knows the basics of projection methods on the plane.
		3	A sudent know the definitions of basic geometric objects and relations between them.
	Skills	1	A student can perform basic geometrical constructions.
		2	A student can use drafting tools.
		3	A student is able to recognize spatial objects.
	Social Competence	1	A student understands the need to identify geometric objects
		2	A student can describe the relations between spatial objects

Course Goals To acquaint students with the correct definition of the location of a point, line and complex shapes in three-dimensional space.

Programme content The student obtains basic and extended knowledge about the principles of descriptive geometry together with the tools and techniques used to draw specific objects with the use of projection methods. The students are being tought the basics of the Monge protocols and 3D projection methods.

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 sudent has an advanced knowledge of methods of projecting complex spatial objects	IS_K1_W 04	W C	C F G I P R
	2				
Skills	1	A sudent has the skill of advanced spatial imagination	IS_K1_U 01	C	C F G I P R
	2	A sudent has the ability to solve practical tasks in the field of stereometry saving design features of objects	IS_K1_U 02	C	C F G I P R
Social Competence	1	A student correctly identifies and resolves relationships between complex spatial objects	IS_K1_K 01	W C	C F G I P R
	2	A student is able to capture and transmit information about spatial objects	IS_K1_K 05	W C	C F G 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. Böhm Michał
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	13
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	10
Examination or final colloquium	2
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. Kluger Krzysztof
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Design of sewage installation
Nazwa przedmiotu	Projektowanie instalacji ściekowych

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

Course code	D.5.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	the principles of engineering design
		2	
	Skills	1	Basic Skills in solving mathematical equations in engineering applications
		2	
	Social Competence	1	A student can think and act in a creative way
		2	A student correctly identifies engineering problems

Course Goals Students learn about the principles of engineering design of sanitary installations, materials and performance principles.

Programme content Overview of sewage systems and their importance in public health and environmental protection. Basic components of sewage systems: collection, conveyance, treatment, and disposal. Determination of design flow rates based on population projections, water usage data, and peak flow considerations. Design considerations for sewage collection networks, including pipe sizing, slope determination, and hydraulic calculations

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 advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design	IS_K1_W02	W P	A M P
	2	Student knows the principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering	IS_K1_W03	W P	A M P
	3	Student has advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering	IS_K1_W04	W P	A M P
Skills	1	A student uses computer programs to solve basic tasks of sanitary installations	IS_K1_U03	P	A M P
	2	A student knows how to perform simple research tasks regarding widely understood environmental protection technologies and in accordance with the given specification - design and implement a simple device, object, system or process typical for environmental engineering	IS_K1_U12	P	A M P
	3	A student is able to identify and formulate simple engineering tasks of a practical nature, related to environmental engineering	IS_K1_U11	P	A M P
Social Competence	1	A student has a sense of responsibility for the results and effects of his professional activity, especially in the context of its impact on the natural environment and the environment	IS_K1_K02	W P	A M P
	2	A student is aware of the importance of professional conduct, compliance with the rules of professional ethics and respect for diversity of views and opinions, and is ready to take care of the achievements and traditions of the engineering profession	IS_K1_K04	W P	A M 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. Boguniewicz-Zabłocka Joanna
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	14
Preparation of a report/paper/ project/presentation	14
Independent study of the course topics	0
Examination or final colloquium	2
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 Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Design work - the environmental area

Nazwa przedmiotu	Praca przejściowa - obszar środowiskowy		
ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	E.12.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student must possess knowledge of the basics of machine and equipment design as well as drafting documentation.
		2	
	Skills	1	A student has the ability to operate CAD software.
		2	A student can independently search for relevant information in available databases.
	Social Competence	1	Self-reliance in solving project problems and the ability to work in a team.
		2	The ability to manage time effectively. Personal discipline.

Course Goals The objective of the course is to prepare students to independently solve project tasks related to implementing mechanical operations in the environmental sector.

Programme content Consolidating skills in planning the project process using appropriate techniques, methods, and tools. Developing students' ability for creative thinking in solving complex engineering problems in the environmental sector.

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 advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design.	IS_K1_W02	P	L
	2	Student has appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices.	IS_K1_W07	P	L
	3	Student has the knowledge necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity	IS_K1_W14	P	L
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions.	IS_K1_U01	P	L
	2	Student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification	IS_K1_U12	P	L
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge.	IS_K1_K01	P	L
	2	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	P	L
	3	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	IS_K1_K05	P	L

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. Borsuk Grzegorz
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	0
Preparation of a report/paper/ project/presentation	15
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 Mechanical Engineering
Course Description Card

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

Course Title	Design work - the industrial area			
Nazwa przedmiotu	Praca przejściowa - obszar przemysłowy			
ECTS points	2	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	E.12.	Subject related to scientific research/pract. profess. prepar. (Y/N)		T

Preliminary requirements of the course	Knowledge	1	The student must possess knowledge of the basics of machine and equipment design as well as drafting documentation.
		2	
	Skills	1	A student has the ability to operate CAD software.
		2	A student can independently search for relevant information in available databases.
	Social Competence	1	Self-reliance in solving project problems and the ability to work in a team.
		2	The ability to manage time effectively. Personal discipline.

Course Goals The objective of the course is to prepare students to independently solve project tasks related to implementing mechanical operations in the industrial sector.

Programme content Consolidating skills in planning the project process using appropriate techniques, methods, and tools. Developing students' ability for creative thinking in solving complex engineering problems in the industrial sector.

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 advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design.	IS_K1_W02	P	L
	2	Student has appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices.	IS_K1_W07	P	L
	3	Student has the knowledge necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity	IS_K1_W14	P	L
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions.	IS_K1_U01	P	L
	2	Student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification	IS_K1_U12	P	L
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge.	IS_K1_K01	P	L
	2	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	P	L
	3	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	IS_K1_K05	P	L

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. Borsuk Grzegorz
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	0
Preparation of a report/paper/ project/presentation	15
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 Mechanical Engineering
Course Description Card

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

Course Title	Differential and integral calculus			
Nazwa przedmiotu	Rachunek różniczkowy i całkowy			
ECTS points	3	Subject type		P
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	A.1.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)		N

Preliminary requirements of the course	Knowledge	1	Some experience with mathematical language and proofs, mathematical logic, theory of sets.
		2	Fundamental knowledge of differential calculus of single variable real functions.
		3	Fundamental knowledge of integral calculus of single variable real functions.
	Skills	1	The ability to abstractional thinking.
		2	The ability to construct proofs of simple theorems.
		3	The ability to formulate problems in the mathematical 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 Differential and integral calculus of two and three variables functions and its applications will be discussed during the 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	Students have knowledge with regard to differential calculus of multivariable functions and its application.	IS_K1_W01	W	C
	2	Students have knowledge with regard to integral calculus of multivariable functions and its application.	IS_K1_W01	W	C
	3	Students know English terminology used in mathematics.	IS_K1_W17	W	C
Skills	1	Students are able to apply differential calculus of multivariable functions to solve certain optimization issues.	IS_K1_U06	C	C E F P
	2	Students are able to apply integral calculus of multivariable functions to solve certain geometric issues.	IS_K1_U06	C	C E F P
	3	Students are able to describe the above problems in English.	IS_K1_U04	C	C E F P
Social Competence	1	Students understand need of continuous improvement in the range of applying of modern mathematics methods used in technology.	IS_K1_K01	W	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)	15	dr inż. Ścięgosz Hanna
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	40
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	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Koziarska Anna
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Diploma work (engineering project)
Nazwa przedmiotu	Praca dyplomowa (Projekt inżynierski)

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

Course code	D.16.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	Competences acquired in the current period of education.
		2	

Course Goals The aim of the subject is to perform a literature review and to collect the output data for the thesis (engineering project).

Programme content Implementation of tasks resulting from the Dissertation Topic Card.

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 in advanced degree knows materials and methods useful for the implementation of the diploma thesis (engineering project).	IS_K1_W02	P	D R
	2	Student knows the principles of engineering design	IS_K1_W02	P	D R
Skills	1	Student acquires information from literature, databases and other sources related to diploma work (engineering project)	IS_K1_U01	P	D R
	2	Student is able to see systemic and non-technical aspects while formulating and solving engineering related to diploma work (engineering project)	IS_K1_U09	P	D R
	3	Student can collect data for the diploma thesis (engineering project) and make their critical analysis.	IS_K1_U11	P	D R
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity	IS_K1_K02	P	D R
	2	Student is able to conduct a critical analysis of data collected for the purpose of the diploma thesis (engineering project)	IS_K1_K05	P	D 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 hab. inż. Kłosok-Bazan Iwona
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	0
Independent study of the course topics	125
Examination or final colloquium	0
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	0

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Diploma work (engineering project)
Nazwa przedmiotu	Praca dyplomowa (Projekt inżynierski)

ECTS points	10	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Examination

Course code	D.16.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	Competences acquired in the current period of education.
		2	

Course Goals The aim of the subject is to prepare a diploma thesis (engineering project)
Programme content Completion of tasks arising from the Dissertation Topic Sheet and not completed in semester IV.

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 advanced knowledge of methods and materials used for solving engineering tasks. do realizacji pracy dyplomowej (projektu inżynierskiego).	IS_K1_W02	P	B R
	2	Student has advanced knowledge of performing a diploma thesis (engineering project)	IS_K1_W02	P	B R
	3	Student has knowledge of electrical systems and thermodynamics, allowing for extensive understanding of the principles of operation of machines and devices in environmental engineering	IS_K1_W05	P	B R
	4	Student has knowledge of law, standards and guidelines used in the design of technical installations and their subsequent operation	IS_K1_W13	P	B R
	5	Student has knowledge of non-technical fields of engineering.	IS_K1_W14	P	B R
	6	Student defines and understands the fundamental problems of modern civilization.	IS_K1_W15	P	B R
Skills	1	Student can accumulate and interpret obtained information, draw conclusions and formulate opinions.	IS_K1_U01	P	B R
	2	Student has skills that allow for efficient functioning in the national economy.	IS_K1_U07	P	B R
	3	Student notices systemic and non-systemic actions in engineering work.	IS_K1_U09	P	B R
	4	Student can formulate simple engineering tasks related to environmental engineering.	IS_K1_U11	P	B R
	5	Student is able to design a simple device, object or installation used in environmental engineering.	IS_K1_U12	P	B R
Social Competence	1	Student has a sense of responsibility and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	P	B R
	2	Student is is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles	IS_K1_K05	P	R
	3	Student understands the need to provide the public with reliable information on engineering achievements	IS_K1_K06	P	B 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 hab. inż. Kłosok-Bazan Iwona
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	0
Independent study of the course topics	250
Examination or final colloquium	0
Additional contact hours	0
Total student workload	250
Number of contact hours (from the study plan)	0

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Elective module - I: Basis of personal development
Nazwa przedmiotu	Moduł wybieralny - I: Podstawy rozwoju osobistego

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

Course code	C.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	
		2	

Course Goals Developing skills in the field of personal development, development in interpersonal relationships, improving interpersonal skills and the ability to interact with other people

Programme content The subject covers familiarization with content allowing the acquisition of knowledge and practical skills in the area of fundamental personal development.

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 selected departments of psychology in the scope needed to describe phenomena and processes related to human functioning	IS_K1_W01	W	C
	2	S/He knows the rules of identification to an advanced degree hazards, health and safety at work, knows techniques coping with stress	IS_K1_W03	W	C
	3	A student has advanced knowledge of the field of observation phenomena and processes taking place in groups social	IS_K1_W09	W	C
Skills	1				
	2				
Social Competence	1	A student understands the need for further education and is able to plan and implement the lifelong learning process on their own, and also critically evaluate its knowledge and skills	IS_K1_K01	W	C
	2	A student has a sense of responsibility for the results and effects of his professional and private activity, especially in the context of its impact on interpersonal relationships	IS_K1_K02	W	C
	3	A student is able to think and act in a creative and innovative way and is ready to critically evaluate his knowledge, abilities and skills; cooperate and work in a group taking over various roles in it; understands the importance of team activities	IS_K1_K05	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 inż. Klemens Brygida
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	10
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	18
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

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dr inż. Wydrych Jacek
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Elective module - I: Social Communication
Nazwa przedmiotu	Moduł wybieralny - I: Komunikacja społeczna

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

Course code	C.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	A student is capable of teamwork
		2	

Course Goals The aim of the course is to prepare students for the effective use of knowledge and skills in communication

Programme content The subject includes familiarization with content enabling the acquisition of knowledge and practical skills in the field of social communication, including the communication process, verbal and nonverbal communication, and communication errors.

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	To an advanced degree has the knowledge necessary to understanding of the social conditions of engineering activities	IS_K1_W14	W	C P R
	2				
Skills	1				
	2				
Social Competence	1	A student can communicate in a comprehensible, creative and innovative ways; cooperate and work in the group by taking over different roles; understands the importance of good communication in the implementation of team activities	IS_K1_K05	W	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. Klemens Brygida
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	8
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	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 Mechanical Engineering
Course Description Card

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

Course Title	Elective module - II: Economics in micro-business
Nazwa przedmiotu	Moduł wybieralny - II: Ekonomia w mikrobiznesie

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

Course code	C.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Fundamentals of mathematics.
		2	
	Skills	1	Self-reliance in studying literature.
		2	
	Social Competence	1	Communication skills, teamwork.
		2	

Course Goals Introducing students to selected fundamental microeconomic issues, principles of decision-making by economic entities, and economic accounting for selected activities.

Programme content Basics of economics, goods and resources, market, demand, supply, price. Fundamental issues regarding the conditions for entrepreneurship development, planning and implementation of entrepreneurial activities, and socio-economic aspects of business 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	Student has the knowledge of economics and management that is appropriate to their studies, including quality management, business operations and technology transfer.	IS_K1_W16	W	C P R
	2				
Skills	1				
	2				
Social Competence	1	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork.	IS_K1_K05	W	C 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. Borsuk Grzegorz
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	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	15
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

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Second		
Course Title	Elective module - II: History of science		
Nazwa przedmiotu	Moduł wybieralny - II: Historia nauki		
ECTS points	2	Subject type	W-HS

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	C.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Basic knowledge in the field of exact sciences
		2	
	Skills	1	A student can collect and integrate knowledge from various sources, including non-technical sources
		2	
	Social Competence	1	A student understands the need for continuous training and the role of non-technical knowledge in shaping the attitude of an engineer
		2	

Course Goals The aim of the course is to present the role of scientific discoveries in the development of technology

Programme content Within the scope of the subject, knowledge is imparted concerning issues related to the historical development of scientific thought, methodologies, and key milestones in the evolution of various scientific disciplines. Students delve into the chronicles of scientific breakthroughs, examining pivotal discoveries, paradigm shifts, and the socio-cultural contexts shaping scientific progress over time. Through this module, students acquire a comprehensive understanding of the interconnectedness between scientific advancement and societal dynamics, fostering critical thinking and analytical skills essential for contextualizing contemporary scientific challenges and developments within their historical framework. Ultimately, students emerge equipped with a nuanced appreciation of the historical narrative of science, enabling them to navigate the complexities of scientific inquiry with insight and perspective.

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 deep knowledge necessary to understand the social, economic, legal, technical and non-technical conditions of engineering activities, especially in the aspect of the history of scientific discoveries	IS_K1_W14	W	N O
	2				
Skills	1				
	2				
Social Competence	1	The student is aware of the importance of scientific discoveries in the development of technology	IS_K1_K04	W	N 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)	30	dr inż. Ligus Grzegorz
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	5
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	15
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 Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering

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

Course Title	Elective module - III: Law and standards in environmental protection
Nazwa przedmiotu	Moduł wybieralny - III: Prawo i normy w ochronie środowiska

ECTS points	1	Subject type	W-HS
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	C.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	General knowledge of the basics of law
		2	
	Skills	1	Ability to argue in discussions
		2	
	Social Competence	1	Awareness of the benefits of continuous expansion of knowledge, including non-technical knowledge
		2	

Course Goals The aim of the course is to provide knowledge in the field of environmental law, including in particular the basics of the functioning and organisation of environmental protection in Poland, the institutional system of environmental protection, the principles of environmental law, familiarisation with basic terminology, as well as an indication of the differences between environmental decisions and other administrative decisions.

Programme content The course imparts knowledge on issues related to binding legal norms for environmental protection. Within the framework of the module, students acquire knowledge of the basics of the legal system in terms of the existing and planned legislative and executive acts aimed at comprehensive and sustainable environmental management. The acquired knowledge in the field of implementation, required by law, of obligations and possible benefits for entities using the environment, allows Students to identify not only the objectives of implementation of provisions of environmental and nature protection law, but also problems arising from the manner of using the environment.

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 including environmental legislation	IS_K1_W13	W	C
	2	Student knows the system of Polish environmental law, the existing links within this system and the relations and links between Polish environmental law and European Union and international law	IS_K1_W13	W	C
	3	Student has knowledge of the quality of the environment (air, water, soil), knows the processes that shape it, knows the principles of sustainable development	IS_K1_W06	W	C
Skills	1				
	2				
Social Competence	1	Student is able to independently and critically complement the knowledge and skills in the field of environmental protection extended by the interdisciplinary dimension	IS_K1_K01	W	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)	15	dr hab. inż. Olszowski Tomasz
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

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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Elective module - III: Social responsibility for environmental protection
Nazwa przedmiotu	Moduł wybieralny - III: Społeczna odpowiedzialność w ochronie środowiska

ECTS points	1	Subject type	W-HS
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	C.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student has knowledge of the application of legal regulations, standards and guidelines in the design and operation of technical facilities
		2	
	Skills	1	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages
		2	
	Social Competence	1	The student respects people presenting different opinions
		2	

Course Goals Understanding the principles and legal aspects of environmental responsibility of society and industry

Programme content Concepts of Social Responsibility and Fundamentals of ISO 26000. Environmental impact assessment metods.

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 about social responsibility for the environment	IS_K1_W06	W	C
	2				
Skills	1				
	2				
Social Competence	1	The student acquires competences to assess the impact of human activities on the environment and actions taken to minimize the negative impact	IS_K1_K06	W	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)	15	dr hab. inż. Kłosok-Bazan Iwona
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

dr hab. inż. Kłosok-Bazan Iwona
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Electrical engineering
Nazwa przedmiotu	Inżynieria elektryczna

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

Course code	D.15.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic information about current flow
		2	
	Skills	1	Transforming equations
		2	Solving systems of equations
	Social Competence	1	Ability to work in a group
		2	

Course Goals To acquaint students with basic knowledge of electrical engineering and electronics, and to acquire the ability to solve simple electrical systems

Programme content Study and application of physics and mathematics combined with elements of electricity, electronics, and electromagnetism to both large and small scale systems to process information.

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	Knowledge of the basic laws of electrical engineering	IS_K1_W05	W C	C D G O
	2	Knowledge of building typical electrical devices	IS_K1_W05	W	C D O
	3	Basic information about electrical networks	IS_K1_W05	W	C D O
Skills	1	Solving simple DC and AC circuits	IS_K1_U12	C	G
	2	Solving simple DC and AC circuits	IS_K1_U02	C	C D G N O
	3	Determining the basic parameters of electrical devices	IS_K1_U11	C	D G
Social Competence	1	Consciousness of dangers related to electric current	IS_K1_K02	W	N 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. Łukasiewicz Ewelina
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	8
Independent study of the course topics	0
Examination or final colloquium	2
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Elements of informatics and foundations of programming
Nazwa przedmiotu	Elementy informatyki i podstawy programowania

ECTS points	5	Subject type	P

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	B.3.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	4th level of the Polish Qualifications Framework
		2	
	Skills	1	4th level of the Polish Qualifications Framework
		2	
	Social Competence	1	4th level of the Polish Qualifications Framework
		2	

Course Goals Presenting selected directions of development of modern computer science and the challenges it faces, introducing students to programming languages.

Programme content The student deepens knowledge in the field of computer science and 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	Student knows the principles of computer technology at the advanced level	IS_K1_W02	W	C D
	2	Student knows the principles of computer programming at the advanced level	IS_K1_W02	W L	C H P
	3	Student knows the applications of computers in engineering practice at the advanced level	IS_K1_W02	W L	C H P
	4	Student knows which software can be useful during study and in professional practice at the advanced level	IS_K1_W02	W L	D P
Skills	1	Student can create text documents using a text editor	IS_K1_U02	L	C H
	2	Student can do calculations using a spreadsheet	IS_K1_U03	L	C H
	3	Student can create a presentation displayed on the screen	IS_K1_U05	L	C N
	4	Student can create simple programs	IS_K1_U03	L	C H
Social Competence	1	Student understands the need for further training and enhancing professional competence	IS_K1_K01	W L	C D 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. Łukasiewicz Ewelina
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	33
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

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Energetic efficiency of industrial processes
Nazwa przedmiotu	Energochłonność procesów przemysłowych

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

Course code	E.8.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge of thermodynamic changes and principles of energy management.
		2	A student understands the basic principles of energy conversion.
	Skills	1	A student obtains information independently from available sources.
		2	
	Social Competence	1	A student is aware of professional conduct in solving problems engineering problems.
		2	

Course Goals To familiarize students with energy balances of a wide range of industrial processes, with particular emphasis on energy-intensive areas of the economy.

Programme content The subject provides knowledge on issues related to the energy consumption of industrial processes. As part of the module, the student acquires knowledge and skills in the field of energy consumption of various industries, assessment of energy consumption of technological processes in an industrial plant and economic aspects in optimizing energy consumption in industry. The acquired knowledge allows you to calculate the energy consumption of complex production technology, including primarily energy balances of individual process stages.

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 understand the principles guiding exploitation of machines and thermodynamic processes inherent in them.	IS_K1_W05	W C P	C K L
	2	Students gain advanced knowledge of the principles of rational energy use, relevant in terms of the rational energy management in industrial processes.	IS_K1_W12	W C P	C K L
Skills	1	Students are able to conduct an initial economic analysis of the realized technical activities with practical application.	IS_K1_U10	C P	C K L
	2	Students gain the ability to comprehend technical and non-technical aspects during statement and solving of standard engineering tasks.	IS_K1_U09	C P	C K L
Social Competence	1	Students are prepared to act creatively and actively when performing tasks individually and in a team.	IS_K1_K05	C P	C K L
	2	Student understand the need to learn and are able to independently plan and implement the lifelong learning proces	IS_K1_K01	W C P	C K L

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. Tic Wilhelm
Calculation class (C)	15	
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)	15
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	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Energetic efficiency of municipal facilities
Nazwa przedmiotu	Energochłonność obiektów komunalnych

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

Course code	E.8.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student knows the basic concepts of energy consumption of processes.
		2	The student knows the methodology of energy balancing.
	Skills	1	The student is able to build energy balances.
		2	Student is able to analyze data, process it and determine energy intensity indicators.
	Social Competence	1	The student is aware of the need to supplement knowledge throughout life and is able to select appropriate methods of learning for himself and others in the context of management of municipal facilities and their energy intensity.
		2	The student understands the non-technical aspects of the activity of the municipal energy manager, among other things, its social consequences and impact on the environment.

Course Goals To acquaint students with the issue of energy consumption of municipal facilities in terms of reducing energy consumption in municipal facilities, reducing greenhouse gas emissions and achieving financial savings for local government units as a way of sustainable development of cities and municipalities.

Programme content Energy characteristics of municipal facilities. Methods of analysis and monitoring of energy consumption in municipal facilities. The main areas of energy consumption and factors affecting the high energy intensity of municipal facilities and resources. Opportunities to apply strategies to improve energy efficiency in municipal facilities.

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 expanded knowledge of energy intensity of municipal facilities and resources.	IS_K1_W01	W P	C K L M P
	2	A student has sufficient for engineering purposes knowledge of the operation of municipal facilities and infrastructure in terms of their energy intensity.	IS_K1_W07	W C P	C K L M P
Skills	1	A student can solve a basic task on the analysis of energy intensity of municipal facilities	IS_K1_U11	C P	C K L M P
	2	A student is able to complete simple analytical tasks, concerning the broad issues of energy intensity of municipal facilities.	IS_K1_U12	C P	C K L M P
Social Competence	1	A student is able to interact and work in a group assuming various roles in it.	IS_K1_K05	W P	C K L M P
	2	A student correctly identifies engineering problems with particular emphasis on energy intensity in the municipal sector.	IS_K1_K03	W C P	C K L M 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. Tańczuk Mariusz
Calculation class (C)	15	
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)	15
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	80
Number of contact hours (from the study plan)	60

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Energy management in industry
Nazwa przedmiotu	Gospodarowanie energią w przemyśle

ECTS points	6	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Examination

Course code	E.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic general knowledge of industrial processes.
		2	Knowledge of the nature of useful energy and the use of fuels and energy resources.
		3	Knowledge of energy units and energy balancing.
	Skills	1	The skill of writing simple energy balances.
		2	Skill in determining the efficiency of simple energy devices.
	Social Competence	1	Student corectly identufies engineering problems and is able to determine the priorities of professional activities.
		2	Student is aware of the importance and understands the non-technical aspects and effects of engineering activities, including their impact on the environment, and the associated responsibility for taken decisions
		3	Student can interact and work in a group, assuming different roles in the group

Course Goals To make students familiar with the issues of energy management related to the processes taking place in industrial installations and systems, with particular emphasis on optimization of energy consumption.

Programme content Energy balancing of processes in industrial plants. Efficiency of industrial processes. Methods of determining the energy intensity of industrial processes. Evaluation of economic efficiency of rational energy management in industry.

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 knows the principles of operation of heat recovery units and devices and has knowledge about the development trends in their construction	IS_K1_W05	W P	A K L M O
	2	Student knows the principles of rational energy management in industrial plants in an advanced degree.	IS_K1_W12	W C	A C
	3	Student has the knowledge necessary to understand the social, economic, legal, technical and non-technical determinants of the energy economy in industry.	IS_K1_W14	W	A
Skills	1	Student is able to apply analytical, simulation and experimental methods to formulate and solve computational problems in energy management in industry.	IS_K1_U06	C	C
	2	Student is able to see systemic and non-technical aspects in the assessment of the energy economy in industry	IS_K1_U09	C	C
	3	Student knows how to prepare prefeasibility studies and economic analysis of energy efficiency measures in industrial plants.	IS_K1_U10	C	C
Social Competence	1	Student has a sense of responsibility for the results and effects of his professional activity in the field of energy management in an industrial plant.	IS_K1_K02	W C P	A C K L M O
	2	Student correctly identifies problems related to improperly conducted energy management in industrial plants	IS_K1_K03	W P	A K L M O
	3	Student is able to think and act in a creative, innovative and entrepreneurial way in terms of optimising energy management in industry.	IS_K1_K05	W P	A K L M 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)	30	dr inż. Tańczuk Mariusz
Calculation class (C)	15	
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)	15
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	16
Examination or final colloquium	4
Additional contact hours	0
Total student workload	150
Number of contact hours (from the study plan)	75

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	First		
Course Title	Energy production techniques		
Nazwa przedmiotu	Techniki pozyskiwania energii		
ECTS points	4	Subject type	K

Language of lecture	angielski	Mode of completing the course	Examination

Course code	D.11.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of technical thermodynamics and energy conversion.
		2	
	Skills	1	Understanding of a number of concepts in the field of energy and fuel management.
		2	
	Social Competence	1	A student is able to notice the effects of human activity in the context of its impact on the environment.
		2	

Course Goals The aim of the course is for students to learn about energy generation techniques used in the national economy, which enable meeting the needs of humanity and industry.

Programme content The thermodynamic basis, conditions and limitations of energy acquisition will be presented. Classic techniques using non-renewable fuels such as classic power plants with power boilers, nuclear power plants and power plants with gas units will be discussed. Techniques using renewable energy sources such as wind, water energy, solar energy and geothermal energy will be discussed. Various aspects of the use of biomass as an energy source will be presented. Problems related to energy storage and transmission 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 knowledge about fossil fuel resources in Poland and worldwide and about the possibilities of their use.	IS_K1_W08	W	A P R
	2	A student understands the importance of the use of renewable energy sources for humanity's livelihood.	IS_K1_W08	W	A P R
	3	A student has an advanced knowledge of the principles, possibilities and limitations of energy efficiency.	IS_K1_W12	W	A P R
Skills	1	-			
	2				
Social Competence	1	A student the need for further training in the field of energy generation techniques	IS_K1_K01	W	A P R
	2	A student correctly identifies engineering and technical problems arising in the processes of energy generation techniques	IS_K1_K03	W	A 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)	45	prof. dr hab. inż. Pospolita Janusz
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)	45
Calculation class (C)	0
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	40
Examination or final colloquium	1
Additional contact hours	0
Total student workload	101
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third
Course Title	Engineering drawing with CAD I
Nazwa przedmiotu	Zapis konstrukcji z wykorzystaniem CAD I

ECTS points	1	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	D.14.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Understanding of Engineering Principles: Familiarity with fundamental engineering concepts such as dimensions, tolerances, scales, and engineering graphics is essential.
		2	Technical Drawing Skills: Proficiency in manual technical drawing techniques including sketching, orthographic projection, isometric drawing, and dimensioning.
	Skills	1	Computer Literacy: Basic computer skills are necessary, including file management, navigating software interfaces, and familiarity with operating systems like Windows
		2	Introduction to CAD Software: Basic understanding of Computer-Aided Design (CAD) software principles, functionalities, and interface navigation.
		3	Geometry and Mathematics: Understanding of basic geometry principles, angles, measurements, and mathematical calculations relevant to technical drawing and CAD design.
		4	Visualization Skills: Ability to visualize three-dimensional objects from two-dimensional drawings and vice versa is important for interpreting engineering drawings accurately.
		5	English Language Proficiency: If the course is conducted in English, a sufficient level of English language proficiency is necessary to understand instructions, lectures, and technical documentation.
	Social Competence	1	A student is able to interact and work in a group taking over different roles in it; understands the importance of team activities
		2	A student correctly identifies engineering problems and can set priorities for professional activities
		3	A student can think and act in a creative, innovative and enterprising way

Course Goals The aim of the course is to familiarize students with the methods of computer-aided CAD design and, on the example of AutoCAD, the acquisition of the ability to use its standard capabilities in practice

Programme content a. Introduction to Engineering Drawing: Basic concepts and principles of engineering drawing. Importance of technical drawings in engineering design and communication. b. CAD Software Basics: Overview of CAD software functionalities and interface navigation. Introduction to drawing tools, commands, and settings in CAD software. c. Geometric Construction: Techniques for constructing geometric shapes, lines, and curves. Understanding geometric relationships and constraints in technical drawing. d. Orthographic Projection: Principles and methods of creating orthographic projections. Multiview drawings: front, top, side views, and their projections. e. Dimensioning and Tolerancing: Guidelines for dimensioning technical drawings accurately. Introduction to tolerances and their application in engineering drawings. f. Isometric Drawing: Techniques for creating isometric views of three-dimensional objects. Understanding isometric axes and scale in isometric drawing. g. Introduction to Assembly Drawings: Basics of assembly drawings, exploded views, and parts lists. Importance of assembly drawings in engineering design and manufacturing. h. Project Work: Practical exercises and assignments using CAD software to create engineering drawings. Real-world applications of technical drawing principles and CAD design skills.

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 advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design.	IS_K1_W02	L	K P R
	2				
Skills	1	Student uses computer software to solve engineering tasks	IS_K1_U03	L	K P R
	2				
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_K1_K01	L	K 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)	0	dr inż. Pochwała Sławomir
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)	0
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	0
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	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Engineering drawing with CAD II
Nazwa przedmiotu	Zapis konstrukcji z wykorzystaniem CAD II

ECTS points	1	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	D.14.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Proficiency in Basic CAD Skills: Students should have a solid understanding and proficiency in basic CAD skills, including software navigation, drawing creation, editing, and dimensioning.
		2	Knowledge of Advanced CAD Features: Familiarity with advanced features and tools of CAD software, such as parametric modeling, assembly design, advanced surface modeling, and simulation.
	Skills	1	Problem-Solving Skills: Strong problem-solving skills to tackle complex design issues and optimize designs for efficiency and functionality.
		2	Critical Thinking Abilities: Ability to analyze design problems critically, evaluate design solutions, and make informed decisions to improve designs.
		3	Communication Skills: Effective communication skills to convey design ideas, collaborate with team members, and present design solutions effectively.
		4	Attention to Detail: High level of attention to detail to ensure accuracy and precision in advanced CAD designs.
	Social Competence	1	A student is able to interact and work in a group taking over different roles in it; understands the importance of team activities
		2	A student correctly identifies engineering problems and can set priorities for professional activities
		3	A student can think and act in a creative, innovative and enterprising way

Course Goals The aim of the course is to familiarize students with the methods of computer-aided CAD design and, on the example of AutoCAD, the acquisition of the ability to use its standard capabilities in practice

Programme content Advanced CAD Software Features: Exploration of advanced features and functionalities of CAD software. Parametric modeling techniques for creating complex and flexible designs. Advanced assembly modeling including assemblies with moving parts and constraints. Advanced 3D Modeling: Advanced techniques for solid modeling including lofting, sweeping, and blending. Surface modeling for creating complex shapes and freeform designs. Incorporating organic shapes and curvature continuity in 3D models. Design Optimization: Strategies for optimizing designs for performance, manufacturability, and cost-effectiveness. Analysis tools for evaluating structural integrity, material usage, and assembly feasibility. Collaborative Design: Collaborative design processes and tools for multi-user environments. Version control and data management strategies for collaborative projects.

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 advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering	IS_K1_W04	L	K P R
	2				
Skills	1	Student uses computer software to solve engineering tasks	IS_K1_U03	L	K P R
	2	Student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification	IS_K1_U12	L	K P R
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_K1_K01	L	K P R
	2	Student correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems	IS_K1_K03	L	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. Pochwała Sławomir
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)	0

Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	0
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	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth
Course Title	Engineering drawing with CAD III
Nazwa przedmiotu	Zapis konstrukcji z wykorzystaniem CAD III

ECTS points	1	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	D.14.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Elementary knowledge of descriptive geometry
		2	Knowledge of the principles of technical drawing
		3	General knowledge of standardized structural elements
	Skills	1	Support standard computer functions
		2	Making technical drawings using traditional technique
	Social Competence	1	Commitment to the process of improving professional qualifications
		2	

Course Goals Preparing the student to use computer-aided design tools in the field of graphic representation of the construction of the equipments.

Programme content As part of the course, students acquire skills in using programs supporting the design of industrial equipment. They will learn the functionality of CAD tools in the field of parametric modeling and visualization of 3D objects.

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 possibilities of using computer support in the design and construction of industrial equipment in the field of mapping the geometry of the structure for the purpose of creating technical documentation	IS_K1_W02	L	G
	2				
Skills	1	The student is able to develop models of machine and camera components, using the basic functions of the selected CAD software.	IS_K1_U03	L	G
	2				
Social Competence	1	The student demonstrates independence and creativity in solving simple engineering tasks.	IS_K1_K05	L	G
	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	dr hab. inż. Dyga Roman
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)	0
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	0
Preparation of a report/paper/ project/presentation	8
Independent study of the course topics	2
Examination or final colloquium	0
Additional contact hours	0
Total student workload	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Sixth		
Course Title	Engineering drawing with CAD IV		
Nazwa przedmiotu	Zapis konstrukcji z wykorzystaniem CAD IV		
ECTS points	1	Subject type	K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	D.14.4.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student knows the principles of technical drawing and engineering graphics to solve technical problems in environmental engineering.
		2	
	Skills	1	A student uses computer programs to solve basic engineering tasks.
		2	
	Social Competence	1	A student correctly identifies engineering problems and is able to determine priorities of professional activities.
		2	

Course Goals The purpose of the course is to familiarize students with the methods of computer-aided design CAD and, using AutoCAD as an example, to acquire the ability to use its standard capabilities in practice.

Programme content The course imparts knowledge and skills that include: use of the coordinate system and tools for modeling and modifying 3D objects. Students will acquire the skills to view a drawing in space, create advanced structures using the ASCI solid modeling method, and practically modify solids. As a result, they will be ready to effectively design advanced structures using AutoCAD in their future professional work.

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 advanced understanding of numerical and computer methods, as well as tools and materials used in contemporary design in particular the use of AutoCAD software.	IS_K1_W02	L	G
	2				
Skills	1	A student uses computer programs, in particular AutoCAD to solve basic engineering tasks.	IS_K1_U03	L	G
	2				
Social Competence	1	A student understands the need for further education and is able to independently plan and implement the process of lifelong learning, as well as critically evaluate the knowledge of computer-aided design in CAD environment.	IS_K1_K01	L	G
	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	dr inż. Masiukiewicz Maciej
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)	0
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	0
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	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Engineering drawing with CAD V
Nazwa przedmiotu	Zapis konstrukcji z wykorzystaniem CAD V

ECTS points	1	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	D.14.5.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student knows the principles of technical drawing and engineering graphics to solve technical problems in environmental engineering.
		2	
	Skills	1	A student is able to use computer programs to solve basic engineering tasks.
		2	
	Social Competence	1	A student understands the need for further training and professional competence in the use of CAD programs.
		2	

Course Goals The purpose of the course is to familiarize students with the methods of computer-aided design CAD and, using AutoCAD as an example, to acquire the ability to use its standard capabilities in practice.

Programme content As part of the course, students will learn advanced techniques for designing, creating 3D models and documenting construction with this specialized tool. This module enables students to learn the principles of effective use of AutoCAD in the process of creating structural designs, which will allow them to effectively operate this tool in professional practice. In addition, the practical ability to analyze, modify and improve existing structural designs using AutoCAD will be provided, which will be an important competency for future engineers involved in design in the technical field.

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 advanced understanding of numerical and computer methods, as well as tools and materials used in contemporary design. Knows the principles of computer-aided engineering design using AutoCAD.	IS_K1_W02	L	G
	2				
Skills	1	A student uses CAD computer programs to solve basic engineering tasks.	IS_K1_U03	L	G
	2				
Social Competence	1	A student understands the need for further education and is able to independently plan and implement the process of lifelong learning, as well as critically evaluate the knowledge of computer-aided design in the AutoCAD environment.	IS_K1_K01	L	G
	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	dr inż. Masiukiewicz Maciej
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)	0
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	0

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	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First
Course Title	Environmental biology and basics of ecology
Nazwa przedmiotu	Biologia środowiska z podstawami ekologii

ECTS points	3	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	A.4.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Basic knowledge of biology and mathematics
		2	
	Skills	1	Ability to work both independently and in a team
		2	Ability to organize work well during laboratory classes
		3	The ability to think creatively.
	Social Competence	1	Willingness to further education.
		2	

Course Goals The aim of the course is to familiarize students with basic concepts related to ecology and selected aspects of environmental biology. The knowledge provided will include, among others: relations at the interface between biocenosis and biotope, the concepts of species, population, ecosystem, circulation of matter and energy flow, the role of producers, consumers and decomposers, as well as selected aspects of human-environment relations. Students will receive not only theoretical knowledge, but also improve their skills in planning work while performing laboratory classes. Independent analysis of problems related to relationships in the environment will develop the student's skills to more easily recognize various situations that may arise in a given habitat.

Programme content The subject provides knowledge regarding basic issues and problems of ecology and environmental biology. During the classes, the student acquires theoretical knowledge, but also practical skills in organizing work in the laboratory and in the field, including: observations and assessment of the impact of selected environmental factors on living organisms or organic matter, observations and characteristics of an example habitat.

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 extended knowledge of selected fields of ecology and environmental biology to the extent necessary to describe phenomena and processes occurring in the environment.	IS_K1_W01	W L	C H P R
	2	The student has systematic knowledge about the role of the natural environment, phenomena occurring in ecosystems, is aware of disturbances in ecosystems, is able to identify.	IS_K1_W06	W L	C H P R
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions.	IS_K1_U01	L	H P R
	2	Student is able to perform simple research tasks regarding ecology and phenomena occurring in the environment.	IS_K1_U12	L	H P R
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_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)	15	dr Kuczuk 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)	15
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	15
Independent study of the course topics	15
Examination or final colloquium	1
Additional contact hours	0
Total student workload	76
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Environmental hazards in industrial processes

Nazwa przedmiotu	Środowiskowe zagrożenia w procesach przemysłowych		
ECTS points	2	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	E.6.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A Student knows the components of the environment and the interdependencies between them.
		2	A Studen has basic knowledge of technology and devices industrial.
	Skills	1	A Studen is able to assess the risk of individual components industrial processes.
		2	
	Social Competence	1	A Studen understands the need for further education.
		2	

Course Goals The aim of the course is to familiarize students with environmental threats in industrial processes

Programme content The subject provides knowledge on issues related to environmental hazards in industrial processes. During the module, the student acquires knowledge and skills in the assessment and analysis of the harmfulness of industrial processes at the design stage, process approval and application for various industries. Acquired knowledge in identifying sources of ecological threats and ecological nuisance in industrial processes allows for determining the degree of harmfulness of an industrial process for various branches of the economy.

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 principles of identification of hazards in environmental engineering	IS_K1_W03	W P	C K L R
	2	Student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards in industrial porcesses and knows how to identify and reduce them	IS_K1_W06	W P	C K L R
Skills	1	Student is able to critically analyze how things work and evaluate existing solutions techniczne, stosowane w procesach przemysłowych	IS_K1_U10	P	K L R
	2	Student is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in environmental engineering	IS_K1_U12	P	K L R
Social Competence	1	Student correctly identifies engineering problems	IS_K1_K03	W P	C K L R
	2	Student is able to think and act in a creative way	IS_K1_K05	P	K L 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. Guziałowska-Tic Joanna
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

dr hab. inż. Hapanowicz Jerzy
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Environmental metrology
Nazwa przedmiotu	Metrologia środowiska

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

Course code	D.13.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge about thermodynamic transformations
		2	A student understands the basic principles of energy conversion
	Skills	1	A student is able to analyze existing technical solutions applied in environmental engineering
		2	A student has the ability to self-study
	Social Competence	1	A student correctly identifies engineering problems
		2	

Course Goals The aim of the course is to provide basic knowledge about the technology and equipment for measuring selected environmental properties and RES equipment.

Programme content The course provides detailed knowledge of measurement methods, instruments and techniques used in monitoring the state of the environment. The student gains competence in the design and implementation of environmental surveys, assessment of the quality of air, water, soil, and the level of noise, radiation and other factors affecting the environment and human health. Emphasis is placed on understanding legal norms and quality standards, as well as learning how to interpret the results of measurements and their application in planning protective and corrective measures. The course curriculum also includes the use of modern IT tools for data analysis and presentation. By combining the theoretical foundations of metrology with the practical aspects of environmental measurement, the course aims to prepare students to effectively solve environmental problems in both the public and private sectors, promoting a responsible and informed approach to environmental issues.

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 extensive knowledge of selected fields of mathematics, physics, chemistry, biology and earth sciences to the extent necessary to measure environmental properties and describe phenomena and processes related to environmental engineering technologies.	IS_K1_W01	W L	C
	2	A student has advanced knowledge of conventional and renewable energy sources, technical and technological possibilities of their acquisition, conversion and application.	IS_K1_W04	W L	C
	3	A student has knowledge of process, phenomena and equipment modelling; he knows numerical and IT methods and tools useful from the point of view of solving engineering tasks in the field of renewable energy sources.	IS_K1_W05	W L	C
	4	To an advanced degree a student has a structured, theoretically based knowledge covering key issues in the field of renewable energy sources and innovative technologies. He has knowledge about the role of humans in the natural environment, is aware of the risks and knows the methods of their identification and mitigation.	IS_K1_W12	W L	C
Skills	1	A student is able to use the achievements of other authors with respect for copyright; using literature, databases and other sources related to technical sciences, is able to integrate information obtained, interpret it, draw conclusions and formulate opinions.	IS_K1_U01	L	C
	2	A student is able to use RES measuring equipment with the ability to estimate errors, plan and carry out experiments, interpret results and formulate conclusions.	IS_K1_U07	L	C
	3	A student is able to carry out analysis of RES engineering tasks and apply simulation methods leading to their solution, interpret the obtained results and draw conclusions, test hypotheses.	IS_K1_U08	L	C

Social Competence	1	A student understands the need for further training in the field of renewable energy sources, improving professional competences; is able to inspire and organize the learning process of others.	IS_K2_K01	W L	C
	2	A student can interact and work in a group, taking on different roles; understands the importance of teamwork and can plan, implement and direct others in lifelong learning. Understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements in the field of RES.	IS_K2_K04	L	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. Anweiler Stanisław
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	8
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	20
Examination or final colloquium	2
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Environmental monitoring
Nazwa przedmiotu	Monitoring środowiska

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

Course code	E.4.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student possesses knowledge about the role of the natural environment.
		2	
	Skills	1	The student is familiar with methods and equipment for investigating basic physical phenomena.
		2	The student is capable of interpreting physical phenomena.
	Social Competence	1	Student has a sense of responsibility for the environment
		2	The student understands the societal role of an engineer.

Course Goals The aim is to familiarize students with the scope of environmental monitoring, the components of the environment, and the methods which are employed.

Programme content The course content includes discussing the scope of environmental monitoring and the methods used to monitor individual environmental components.

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 specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them	IS_K1_W06	W	C
	2	Student has knowledge in the observation of phenomena and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental monitoring	IS_K1_W09	L	H P
Skills	1	Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	IS_K1_U01	W	C
	2	Student is able to carry out simple research tasks concerning broadly understood environmental protection in accordance with the provided specification	IS_K1_U12	L	C H P
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	W L	C H P
	2	Student understands the social role of the engineer and understands the need to provide reliable information to the public.	IS_K1_K06	L	C H 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. Wzorek Małgorzata
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	5
Preparation of a report/paper/ project/presentation	8
Independent study of the course topics	5
Examination or final colloquium	2
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Environmental protection
Nazwa przedmiotu	Ochrona środowiska

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

Course code	A.5.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has general knowledge of selected areas of chemistry, biology and science about land at the high school level.
		2	
	Skills	1	A student obtains information from literature, databases and others sources related to technical sciences.
		2	
	Social Competence	1	A student understands the need for further education and competence development professional
		2	

Course Goals The aim of the course is to familiarize students with the basic concepts related to environmental protection

Programme content The subject provides knowledge on basic issues related to environmental protection. As part of the module, the student acquires knowledge of a set of ideas, measures and activities aimed at maintaining the environment in a condition that ensures optimal living conditions, guaranteeing the continuity of the most important processes in the biosphere. They also acquire knowledge about preventing or counteracting the harmful effects of human activity on the environment.

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 specialist and systematic knowledge of the role of the natural environment, is aware of natural and anthropogenic hazards and knows how to identify and reduce them	IS_K1_W06	W	C
	2	Student has knowledge in the observation of phenomena and processes that is appropriate with environmental protection	IS_K1_W09	W	C
Skills	1				
	2				
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment and its protection	IS_K1_K02	W	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 hab. inż. Guziałowska-Tic Joanna
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	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

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	First
Course Title	Ergonomics and industrial safety and hygiene

Nazwa przedmiotu	Ergonomia oraz bezpieczeństwo i higiena pracy		
ECTS points	1	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	B.4.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Student knows how to carry out construction works in accordance with the principles of safe and hygienic working conditions and ergonomics.
		2	
	Skills	1	Student has the ability to basic interpretation of legal provisions contained in the Labor Code.
		2	
	Social Competence	1	Paying attention to various emerging threats.
		2	Student understands the importance of safety in carrying out construction works.

Course Goals To acquaint students with the issues of occupational health and safety and ergonomics in construction.

Programme content The subject provides knowledge on issues related to occupational health and safety and ergonomics in construction. During the lecture, the student acquires knowledge and skills in identifying threats that may occur during construction works.

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 principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering.	IS_K1_W03	W	C
	2				
Skills	1	A student has the preparation necessary to work in industry and knows the rules of occupational safety and health.	IS_K1_U07	W	C
	2				
Social Competence	1	A student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge.	IS_K1_K01	W	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)	15	dr inż. Tatara Marcin
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	10
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	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Excavation works
Nazwa przedmiotu	Ziemne roboty instalacyjne

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

Course code	E.7.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge of thermodynamics and understands principles of operation of machines and devices used in environmental engineering.
		2	
	Skills	1	A student is able to make a critical analysis of the functioning and assess existing technical solutions
		2	
	Social Competence	1	A student understands the importance of providing safe working conditions.
		2	

Course Goals Preparing students to use the technologies used in the design and works related to earthwork installation works.

Programme content Familiarizing students with the procedure and phases of the investment process, including: components of the construction (executive) design, design documentation as the basis for organizing installation works, types and selection of construction machines and devices for the project, measurements of works and guidelines for carrying out installation works in relation to the water supply network, gas and sewage.

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 sufficient knowledge for engineering purposes on the construction and operation of municipal infrastructure.	IS_K1_W10	W P	C K L
	2				
Skills	1	A student obtains information from literature, databases and other sources related to technical sciences	IS_K1_U01	P	K L
	2				
Social Competence	1	A student understands the need to learn and improve professional skills	IS_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)	30	dr inż. Prażnowski Krzysztof
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	30
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	25

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 Mechanical Engineering
Course Description Card

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

Course Title	Final seminary - the environmental area
Nazwa przedmiotu	Seminarium dyplomowe - obszar środowiskowy

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

Course code	E.13.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	A student understands the need for further training, raising professional competences
		2	

Course Goals Preparing students for the final exam, tutoring on professional issues

Programme content Students' own presentations related to the development of issues related to the diploma exam and realisation of the diploma thesis.

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 extensive knowledge in selected fields of mathematics, physics, chemistry, biology and earth sciences	IS_K1_W01	S	E P
	2				
Skills	1	Student acquires information from literature, databases and other sources related to technical sciences	IS_K1_U01	S	E P
	2				
Social Competence	1	Student understands the need for further education, raising professional competences, can inspire and organize the learning process	IS_K1_K01	S	E 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	dr hab. inż. Kłosok-Bazan Iwona
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	30
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	0

Examination or final colloquium	0
Additional contact hours	0
Total student workload	80
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Final seminary - the industrial area
Nazwa przedmiotu	Seminarium dyplomowe - obszar przemysłowy

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

Course code	E.13.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	
		2	

Course Goals Preparing students to write a diploma thesis and a summary of general knowledge in the field of study, taking into account the industrial aspect

Programme content Students' own presentations related to the development of issues related to the diploma exam and realisation of the diploma thesis.

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 necessary to understand the social, economic, legal, technical and non-technical aspects of engineering activity	IS_K1_W14	S	N O P
	2				
Skills	1	Student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering with particular emphasis on the industrial sphere	IS_K1_U12	S	N O P
	2				
Social Competence	1	Student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession	IS_K2_K04	S	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	dr hab. inż. Kłosok-Bazan Iwona
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	30
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	0
Examination or final colloquium	0
Additional contact hours	0
Total student workload	80
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fourth
Course Title	Fluid mechanics
Nazwa przedmiotu	Mechanika płynów

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

Course code	A.9.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Knowledge of the basic laws of physics and mechanics
		2	Knowledge of the basics of mathematical analysis
	Skills	1	Ability to balance forces, moments of mass, momentum and energy
		2	Ability to solve simple integrals and algebraic equations
	Social Competence	1	A student is aware of the importance of engineering activities
		2	Ability to work as a team and indyvidual

Course Goals Knowledge of the phisical properties of fluids. Knowledge of elements of statics, kinematics and fluid dynamics. Acquiring the ability to calculate pressure drop and design of simple flow systems. The ability to measure selected thermal and flow quantities and to choice of measurement methodology

Programme content Physical properties of fluids, elements of fluid statics, kinematics, and dynamics, basics of thermodynamic phenomena, ideal gas, heat transfer.

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 extensive knowledge of the phenomena govering the flow of fluids	IS_K1_W01	W C L	A C H
	2	A student has appripriate knowledge allowing to analyze phenomena and processes related to the operation of flow systems and processes in Environmental Engineering	IS_K1_W07	W C L	C I J
Skills	1	A student is able to plan basic flow measurements and critically interpret them	IS_K1_U06	L	H I J
	2	A student can handle basic measuring devices and assess uncertainty of measurements	IS_K1_U08	C L	H I
Social Competence	1	A student understands the need for further education and can independently plan and implement the lifelong learning process, as well as critically evaluate knowledge	IS_K1_K01	C 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. Borsuk Grzegorz
Calculation class (C)	30	
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)	30
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	18
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	15
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	75

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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	B.2.1	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student has lexical and grammar knowledge at B2 level accordiing to the Common European Framework of Reference for Languages (CEFR).
		2	
	Skills	1	The student can use the English language at B2 level according to the Common European Framework of Reference for Languages (CEFR).
		2	
	Social Competence	1	The student understands the need for self-study..
		2	The student can collaborate with a group accepting various roles.

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 Environmental 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 foreign language theory and terminology well enough to use the English language at C level of the Common European Framework of Reference for Languages	IS_K1_W17	L	C E F P
	2				
Skills	1	The student can use the English language at C level of European Language Level scale (CEFR)	IS_K1_U04	L	C E F P
	2	The student is able to prepare and make an oral presentation on specific engineering issues in English	IS_K1_U05	L	C E F P
Social Competence	1	The student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_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	12

Preparation of a report/paper/ project/presentation	6
Independent study of the course topics	12
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 Świerczewska Beata
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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	B.2.2	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student has lexical and grammar knowledge at B2 level according to the the Common European Framework of Reference for Languages (CEFR)
		2	
	Skills	1	The student can use the English language at B2 level according to the Common European Framework of Reference for Languages (CEFR)
		2	
	Social Competence	1	The student understands the need for self-study.
		2	The student can collaborate with a group accepting various roles.

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 Environmental 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 foreign language theory and terminologywell enough to use The English language at C level of the Common European Framework of Reference for Languages	IS_K1_W17	L	C E F P
	2				
Skills	1	The student is able to use the English language at C level of the Common European Framework of Reference for Languages	IS_K1_U04	L	C E F P
	2	The student is able to prepare and make an oral presentation on specific engineering issues in English	IS_K1_U05	L	C E F P
Social Competence	1	The student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge.	IS_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	12
Preparation of a report/paper/ project/presentation	6
Independent study of the course topics	12
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 Świerczewska Beata
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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	B.2.3	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student has lexical and grammar knowledge at B2 level according to the the Common European Framework of Reference for Languages (CEFR)
		2	
	Skills	1	The student can use the English language at B2 level according to the Common European Framework of Reference for Languages (CEFR)
		2	
	Social Competence	1	The student understands the need for self-study..
		2	The student can collaborate with a group accepting various roles.

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 Environmental 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 foreign language theory and terminology well enough to use the English language at C level of the Common European Framework of Reference for Languages	IS_K1_W17	L	C E F P
	2				
Skills	1	The student is able to use a foreign language at C level of the Common European Framework of Reference for Languages	IS_K1_U04	L	C E F P
	2	The student is able to prepare and make an oral presentation on specific engineering issues in English	IS_K1_U05	L	C E F P
Social Competence	1	The student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_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	12
Preparation of a report/paper/ project/presentation	6
Independent study of the course topics	12
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 Świerczewska Beata
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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	B.2.4	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student has lexical and grammar knowledge at B2 level according to the the Common European Framework of Reference for Languages (CEFR)
		2	
	Skills	1	The student can use the English language at B2 level according to the Common European Framework of Reference for Languages (CEFR)
		2	
	Social Competence	1	The student understands the need for self-study..
		2	The student can collaborate with a group accepting various roles.

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 Environmental 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 foreign language theory and terminology well enough to use the English language at C level of the Common European Framework of Reference for Languages	IS_K1_W17	L	A B C E F P
	2				
Skills	1	The student can use a foreign language at C level of the Common European Framework of Reference for Languages	IS_K1_U04	L	A B C E F P
	2	The student is able to prepare and make an oral presentation on specific engineering issues in English	IS_K1_U05	L	A B C E F P
Social Competence	1	The student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_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. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Politechnika Opolska
Wydział Mechaniczny
Karta Opisu Przedmiotu

Kierunek studiów	Environmental 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	B.2.1	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 foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	IS_K1_W05	L	C E F P
	2				
Umiejętności	1	A student has self-study skills	IS_K1_U02	L	C E F P
	2	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages.	IS_K1_U03	L	C E F P
Kompetencje społeczne	1	A student is aware of the need to improve their knowledge throughout life and is able to select the appropriate learning methods for themselves and others.	IS_K1_K01	L	P
	2	A student understands the importance of teamwork and is able to take responsibility for the results of joint activities	IS_K1_K04	L	P

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	0
Samodzielne studiowanie tematyki zajęć	10
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. Wydrych Jacek
Dziekan Wydziału
(pieczęć/podpis)

Politechnika Opolska
Wydział Mechaniczny
Karta Opisu Przedmiotu

Kierunek studiów	Environmental 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	B.2.2	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 foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	IS_K1_W05	L	C E F P
	2				
Umiejętności	1	A student has self-study skills	IS_K1_U02	L	C E F P
	2	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages.	IS_K1_U03	L	C E F P
Kompetencje społeczne	1	A student is aware of the need to improve their knowledge throughout life and is able to select the appropriate learning methods for themselves and others.	IS_K1_K01	L	P
	2	A student understands the importance of teamwork and is able to take responsibility for the results of joint activities	IS_K1_K04	L	P

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	0
Samodzielne studiowanie tematyki zajęć	10
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. Wydrych Jacek
Dziekan Wydziału
(pieczęć/podpis)

Politechnika Opolska
Wydział Mechaniczny
Karta Opisu Przedmiotu

Kierunek studiów	Environmental 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	B.2.3	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 foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	IS_K1_W05	L	C E F P
	2				
Umiejętności	1	A student has self-study skills	IS_K1_U02	L	C E F P
	2	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages.	IS_K1_U03	L	C E F P
Kompetencje społeczne	1	A student is aware of the need to improve their knowledge throughout life and is able to select the appropriate learning methods for themselves and others.	IS_K1_K01	L	P
	2	A student understands the importance of teamwork and is able to take responsibility for the results of joint activities	IS_K1_K04	L	P

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	0
Samodzielne studiowanie tematyki zajęć	10
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. Wydrych Jacek
Dziekan Wydziału
(pieczęć/podpis)

Politechnika Opolska
Wydział Mechaniczny
Karta Opisu Przedmiotu

Kierunek studiów	Environmental 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	B.2.4	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 foreign language theory and terminology enough to use a foreign language at the B2 level of the Common European Framework of Reference for Languages	IS_K1_W05	L	A B C E F O P
	2				
Umiejętności	1	A student has self-study skills	IS_K1_U02	L	A B C E F O P
	2	A student is able to use a foreign language at the B2 level of the Common European Framework of Reference for Languages.	IS_K1_U03	L	A B C E F O P
Kompetencje społeczne	1	A student is aware of the need to improve their knowledge throughout life and is able to select the appropriate learning methods for themselves and others.	IS_K1_K01	L	P
	2	A student understands the importance of teamwork and is able to take responsibility for the results of joint activities	IS_K1_K04	L	P

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	2
Samodzielne studiowanie tematyki zajęć	8
Egzamin lub kolokwium zaliczeniowe	2
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. Wydrych Jacek
Dziekan Wydziału
(pieczęć/podpis)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Gas system design
Nazwa przedmiotu	Projektowanie instalacji gazowych

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

Course code	D.5.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Student has a basic knowledge of thermodynamics, fluid mechanics and mechanical engineering.
		2	
	Skills	1	Student is able to analyze information from various sources and conduct process calculations.
		2	
	Social Competence	1	Student understands the need for further education.
		2	Student understands the social role of an engineer.

Course Goals The aim of the subject is to provide knowledge on gas system design and construction, as well as technical equipment selection for gas installations. Students will acquire essential skills in identifying operational and safety concerns associated with gas installations.

Programme content The subject provides knowledge on issues related to the design of gas systems. Within the module, students acquire essential knowledge and skills for designing gas systems and selecting equipment for installations. Additionally, they learn to identify operational and safety concerns associated with gas flow. The knowledge acquired enables students to apply a systemic approach to ensure the continuity and safety of gas system processes and fosters a sense of responsibility for the reliable operation of the designed installations.

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 possesses advanced knowledge of the principles of designing gas installations.	IS_K1_W02	W P	C L
	2	Student knows the construction and operation of basic gas appliances.	IS_K1_W07	W P	C L
Skills	1	Student can solve the basic engineering task related to gas installations.	IS_K1_U11	P	M
	2	Student is able to solve the basic problem concerning gas installations.	IS_K1_U12	P	M
Social Competence	1	Student recognizes the importance of learning and enhancing their professional skills in design and operating gas system installations.	IS_K1_K01	W P	M P R
	2	Student has a sense of responsibility for the consequences of their professional actions, particularly regarding their impact on the natural environment and human life within the realm of gas installation design.	IS_K1_K02	W P	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)	15	dr inż. Płaczek Małgorzata
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	15
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)	45

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	General chemistry
Nazwa przedmiotu	Chemia ogólna

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

Course code	A.3.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	General knowledge of chemistry at high school level.
		2	
	Skills	1	Ability to use professional literature.
		2	
	Social Competence	1	A student understands the need for continuous training.
		2	

Course Goals	The aim of the course is to familiarize students with the basic concepts and calculations in general chemistry.

Programme content The subject provides knowledge about basic issues in chemistry inorganic. During the module, the student acquires knowledge and skills, among others basic concepts and chemical laws, types and types of chemical reactions, preparation and structure of inorganic compounds and the periodic table of elements. Acquired knowledge in in the field of basic issues in inorganic chemistry allows you to perform calculations in scope of molar calculations, molar and percentage concentrations and concentration conversions and stoichiometric calculations.

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 extensive knowledge in selected fields of general chemistry to the extent necessary to describe phenomena and processes related to environmental engineering technologies	IS_K1_W01	W C	C I J
	2				
Skills	1	Student acquires information from literature, databases and other sources related to general chemistry	IS_K1_U01	C	C I J
	2	Student is able to identify and formulate practical engineering tasks in general chemistry related to environmental engineering	IS_K1_U11	C	C I J
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process	IS_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)	15	dr hab. inż. Guziałowska-Tic Joanna
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	25
Preparation of a report/paper/ project/presentation	0
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

dr hab. inż. Hapanowicz Jerzy
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(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	General Mathematics
Nazwa przedmiotu	Matematyka ogólna

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

Course code	A.1.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Students have knowledge on mathematics at the secondary school level.
		2	
	Skills	1	Students are prepared to acquire knowledge independently.
		2	Students are able to apply basic mathematical tools and techniques.
	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.

Programme content Complex numbers, matrix calculus, determinants, systems of linear equations, analytic geometry in R3, fundamental one variable functions, with particular emphasis on exponential and logaritmic functions, limits continuity of functions will be discussed during the lectures and exercises.

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 the concept of complex numbers.	IS_K1_W01	W	A F P
	2	Students know the basic concepts of operations on the matrices and basic methods of solving of systems of linear equations.	IS_K1_W01	W	A F P
	3	Students know the basic concepts of operations on the vectors.	IS_K1_W01	W	A F P
	4	Students know the properties of fundamental functions, the definitions of the limit, continuity of one variable function.	IS_K1_W01	W	A F P
Skills	1	Students are able to make operations on complex numbers. solve complex square equations.	IS_K1_U06	C	E F P
	2	Students are able to make operations on matrices, calculate the determinants and solve the system of linear equations.	IS_K1_U06	C	E F P
	3	Students are able to make operations on vectors in 3-D space.	IS_K1_U06	C	E F P
	4	Students are able to calculate limits of functions and check their continuity.	IS_K1_U06	C	E 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.	IS_K1_K01	W C	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. Ścięgosz Hanna
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	55
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	8
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

dr Koziarska Anna
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dr inż. Wydrych Jacek
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering

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

Course Title	General Physics
Nazwa przedmiotu	Fizyka ogólna

ECTS points	1	Subject type	P
Language of lecture	angielski	Mode of completing the course	Course credit

Course code	A.2.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Students have basic knowledge of physic and and chemistry at a level of secondary school.
		2	Students have the knowledge of mathematics that enables them to analyze and interpret physical formulas.
	Skills	1	The student is able to perform a preliminary analysis of physical tasks and use familiar mathematical methods to solve them.
		2	
	Social Competence	1	Students can think and act individually and work in groups.
		2	

Course Goals Familirizing students with using physical laws at work and in everyday life.

Programme content 1. The subject provides knowledge of the kinematics of the progressive motion of a material point and the rotational motion of a rigid body, necessary in the description of the kinetics of phenomena and processes occurring in nature. 2. The student acquires knowledge about the laws of dynamics and physical quantities used to describe phenomena, including cause and effect relationships. 3. The acquired knowledge in the field of kinematic, dynamic description of vibration and wave motion allows for the quantitative description and analysis of wave phenomena necessary in characterizing the operation of devices in environmental processes.

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 the kinematic description of various types of movements of material points and rotational movements of a rigid body necessary in the quantitative description of the kinetics of processes.	IS_K1_W01	W	C
	2	A student knows and understands the laws of dynamics allowing for a cause-and-effect description of physical phenomena.	IS_K1_W01	W	C
	3	A student has knowledge of wave motion and vibrations necessary to characterize processes in which vibrations, resonances or wave phenomena affect environmental processes.	IS_K1_W01	W	C
Skills	1				
	2				
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_K1_K01	W	C 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 Kostrzewa 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)	15
Calculation class (C)	0
Laboratory class (L)	0

Project (P)	0
Seminar (S)	0
Preparation for classes	14
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	0
Examination or final colloquium	1
Additional contact hours	0
Total student workload	30
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. Kozdraś Andrzej
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dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Fifth
Course Title	Geodesy with geographic information elements
Nazwa przedmiotu	Geodezja z elementami informacji przestrzennej

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

Course code	D.9.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	In the field of modern computer technologies
		2	
	Skills	1	Computer skills
		2	
	Social Competence	1	No requirements
		2	

Course Goals The general purpose and scope of the subject includes geodetic methods regarding measurements and inventory studies; situational, altitude and situational-height as well as measurements and implementation studies, resulting from project and investment tasks carried out in the field of environmental engineering. It also includes familiarizing the student with the basic geodetic and photogrammetric-remote sensing methods and spatial information systems in the field of acquiring, processing and cartographic and digital sharing of spatial geoinformation about the Earth and its environment, necessary for the needs of environmental engineering
Programme content Geodesy. Geodetic documentation. Maps. Spatial data. Cartographic mappings. Projections.Spatial analysis. Network models. Application of spatial information systems. GPS.

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 IT tools useful for the spatial presentation of simple engineering tasks in an advanced level	IS_K1_W02	W	C
	2	Student knows the principles of spatial computer programming supporting the design of environmental infrastructure	IS_K1_W03	W L P	C H I J K L M
	3	The student has appropriate knowledge about basic geodetic measurements	IS_K1_W09	W L	C H I J
Skills	1	The student uses computer programs for spatial presentation of environmental issues	IS_K1_U03	L P	H I J K L M
	2	Student can use a variety of maps and surveying studies	IS_K1_U01	L P	H I J K L M
	3	The student is prepared to cooperate with geodesists	IS_K1_U02	W L P	C H I J K L M
Social Competence	1	Student can think and act in a creative way during the implementation of thematic maps	IS_K1_K05	L	H 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)	15	dr inż. Wydrych Jacek
Calculation class (C)	0	
Laboratory class (L)	15	
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)	15
Project (P)	15
Seminar (S)	0
Preparation for classes	3
Preparation of a report/paper/ project/presentation	20
Independent study of the course topics	6
Examination or final colloquium	1
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Fifth		
Course Title	Geotechnics and soil mechanics		
Nazwa przedmiotu	Geotechnika i mechanika gruntów		
ECTS points	1	Subject type	K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	D.8.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student knows the basics of algebra, geometry and mathematical analysis, as well as statics and mechanics.
		2	A student knows and understands strength cases, methods of analysis of statically determinate and indeterminate systems, the basics of the theory of elasticity.
	Skills	1	A student can determine the state of stress and strain in strength tasks
		2	A student has the skills of independent and team work
	Social Competence	1	A student can think and act in a creative way
		2	Correctly identifies engineering problems

Course Goals The aim of the subject is to provide students with theoretical foundations allowing for solving geotechnical tasks related to the design and construction of engineering structures

Programme content Geological processes. Geological and engineering documentation. Soil classification and properties. Stresses and strains in the ground. Strengthening of slopes and excavations.

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 structure of the soil, its physical and mechanical features.	IS_K1_W11	W	C
	2	A student has advanced knowledge of soil substrate modeling, analysis of the stress state in the substrate, settlement and bearing capacity ground and rules of slope stability testing.	IS_K1_W02	W	C
Skills	1	A student can determine the type of soil based on physical and mechanical features of the ground, and - to present their impact on the strength of the soil.	IS_K1_U12	W	C
	2	A student is able to determine the state of stress in the loaded substrate ground, determine its subsidence and carrying capacity as well to check the slope stability.	IS_K1_U11	W	C
Social Competence	1	A student understands the need to learn and lifting professional competences	IS_K1_K01	W	C
	2	A student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of geotechnics	IS_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. Kokocińska-Pakiet Elżbieta
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	2
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	8
Examination or final colloquium	0
Additional contact hours	0
Total student workload	25
Number of contact hours (from the study plan)	15

* hour (class) means 45 minutes

dr hab. inż. Górski Piotr
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Heating, ventilation and air - conditioning
Nazwa przedmiotu	Ogrzewnictwo, wentylacja i klimatyzacja

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

Course code	D.4.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Students have basic knowledge of thermodynamics and understand the principles of equipment operation.
		2	
	Skills	1	Students can apply analytical methods to formulate and solve engineering problems.
		2	
	Social Competence	1	Students have the feeling of responsibility for the effects of their activity.
		2	

Course Goals The objective of the course involves the basic knowledge needed to conduct analysis concerned with the hygiene, climate and engineering aspects related to the development of heating, ventilation and air-conditioning installations in building objects.

Programme content Within the course, knowledge is conveyed regarding the construction and operation of heating, ventilation, and air conditioning installations. The acquired knowledge will enable students to develop design skills, and the acquired social competencies will enable them to conduct engineering activities in a creative manner while maintaining full responsibility for their consequences.

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 advanced knowledge of numerical and computerised methods and tools and materials used for solving engineering tasks. Student knows the principles of engineering design	IS_K1_W02	W P	C K M
	2	Student has knowledge of electrical systems and thermodynamics, allowing for extensive understanding of the principles of operation of machines and devices	IS_K1_W05	W P	C K M
	3	Student has advanced knowledge of the principles of rational energy, waste and wastewater management as well as heat transfer and energy conversion	IS_K1_W12	W	C K
	4	Student has knowledge of the application of legal regulations, standards and guidelines in the design and operation of technical facilities	IS_K1_W13	W P	C K M
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences.	IS_K1_U01	P	K L M
	2	Student uses computer software to solve engineering tasks.	IS_K1_U03	P	K L M
	3	Student is able to identify and formulate practical engineering tasks related to environmental engineering	IS_K1_U11	P	K L M
	4	Student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of heating, ventilation and air - conditioning	IS_K1_U12	P	K L M
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment.	IS_K1_K02	W P	C K L M R
	2	The student is capable of thinking and acting in a creative, innovative, and entrepreneurial manner in the field of heating, ventilation, and air conditioning. They are prepared to critically evaluate their knowledge, collaborate and work effectively in groups, assuming various roles, and understand the importance of teamwork.	IS_K1_K05	P	K L M 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. Szmolke Norbert
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	5
Preparation of a report/paper/ project/presentation	6
Independent study of the course topics	3
Examination or final colloquium	1
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Hydrology, meteorology and climatology
Nazwa przedmiotu	Hydrologia, meteorologia i klimatologia

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

Course code	D.8.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Understanding the fundamentals of physical and chemical laws
		2	Using of mathematics to describe selected phenomena occurring in nature
		3	Understanding the fundamentals of ecology
	Skills	1	Distinguish between basic physical and chemical processes occurring in nature
		2	Description of physical and chemical phenomena and processes occurring in nature
	Social Competence	1	Identification of basic meteorological and hydro-logical phenomena
		2	The ability to verify received information

Course Goals The purpose of the course is to familiarize Students with the problems of earth sciences. As part of the course, Students will learn about the most important factors determining the circulation of heat, water and energy, and hear about the most important conditions affecting atmospheric circulation, weather condition and the climate.

Programme content The course imparts knowledge on issues related to climatic factors and atmospheric circulation with particular emphasis on radiation balance and water balance. Within the framework of the module, the student acquires knowledge of the basics of climate system operation and planetary heat circulation. The acquired knowledge allows students to understand the effects of mechanisms and processes of heat, water and air circulation in the natural environment. The student acquires knowledge of atmospheric and natural phenomena and develops competence in the study of water balance.

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 a structured knowledge of the role of the environment; is aware of the risks and knows the methods to identify and reduce them	IS_K1_W06	W P	A K N O
	2	Student has knowledge of meteorological, hydrological and climatic phenomena and processes and is familiar with the methods and apparatus for studying the basic quantities characterising these phenomena	IS_K1_W01	W P	A K N O
Skills	1	Student has self-education skills. Acquires information from literature, databases and other sources related to technical sciences. Is able to integrate information obtained, interpret it, draw conclusions and formulate opinions	IS_K1_U01	P	K N O
	2	Students is able to carry out a hydro-logical analysis of a selected area.	IS_K1_U06	P	K N O
	3	Student is able to observe phenomena and processes and will be able to carry out calculations of characteristic physical quantities describing the water cycle.	IS_K1_U09	P	K N O
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	W P	A K N O
	2	Student understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements	IS_K1_K06	W P	A K 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)	30	dr hab. inż. Olszowski Tomasz
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	2
Preparation of a report/paper/ project/presentation	14
Independent study of the course topics	10
Examination or final colloquium	4
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Impact assessment of the enterprises on the environment
Nazwa przedmiotu	Ocena oddziaływania przedsiębiorstw na środowisko

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

Course code	E.9.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge of the production process
		2	A student knows the pollutants affecting the quality of the environment
	Skills	1	A student is able to analyze data
		2	
	Social Competence	1	A student understands the social role of an engineer
		2	

Course Goals Providing knowledge regarding procedures for assessing the environmental impact of projects. Developing the ability to analyze data on environmental components and factors that degrade the environment resulting from industrial activities.

Programme content The subject provides knowledge on issues related to human industrial activity. As part of the module, the student acquires knowledge and skills in analyzing available data about the production process and the resulting environmental threats.

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 specialized and systematic knowledge about possible risk to the natural environment and knows methods for their reduction.	IS_K1_W06	W	C L
	2	Student has knowledge about the application of the environmental impact assessment procedure in design and operation of the investment.	IS_K1_W13	W P	C L
Skills	1	Student can obtain the information from strategic documents and databases to assess the environmental impact of projects.	IS_K1_U01	P	L
	2	Student can make a critical technical analysis of the realization and operation of the investment.	IS_K1_U10	P	L
Social Competence	1	Student has a sense of responsibility for his analyzes and assessments in the aspect of the effects they create for the environment and economy.	IS_K1_K02	W P	C L
	2	Student understands the need to provide reliable information and understands the social and environmental impact of this information.	IS_K1_K06	W P	C L

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. Król 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	10
Preparation of a report/paper/ project/presentation	10
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)	60

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Industrial pollutions
Nazwa przedmiotu	Zanieczyszczenia przemysłowe

ECTS points	2	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit

Course code	E.4.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has knowledge of technical solutions and environmental protection processes
		2	
	Skills	1	Student is able to gather information from literature
		2	Student can analyze presented issues and draw conclusions
	Social Competence	1	Students understands lifelong learning education
		2	Student understands the social role of the engineer

Course Goals The aim of the course is to familiarize students with the environmental impact of various industries and methods to protect against the negative impact of industry on the environment.

Programme content The content of the lectures encompasses the understanding of technologies aimed at reducing industrial pollution introduced into the environment. Case studies will be analyzed to practically illustrate the discussed issues.

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 principles of identification of hazards during the construction and operation of different type of industry	IS_K1_W03	W L	C
	2	Student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them	IS_K1_W06	L	C P R
Skills	1	Student is able to see systemic and non-technical aspects while formulating and solving engineering tasks	IS_K1_U09	L	C
	2	Student is able to carry out simple research tasks concerning with environmental engineering	IS_K1_U12	L	C P R
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	L	C P R
	2	Student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views and opinions; is also ready to cherish the achievements and traditions of the engineering profession	IS_K1_K04	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 hab. inż. Wzorek Małgorzata
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	5
Preparation of a report/paper/ project/presentation	8
Independent study of the course topics	5
Examination or final colloquium	2
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Industry water management
Nazwa przedmiotu	Gospodarka wodna w przemyśle

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

Course code	E.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	Student understands the need for further training, raising professional competences
		2	

Course Goals To acquaint students with the principles of water management and technologies for water treatment in industry.

Programme content Principles of water and wastewater management in selected industrial plants.

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	To an advanced degree, the student has knowledge of water management, knows the basics of water circulation in industry	IS_K1_W12	W P	C K L
	2	The student knows the principles of rational management of water and wastewater and legal guidelines applicable to the	IS_K1_W13	W	C
Skills	1	The student acquires information from literature, databases and other sources related to technical sciences; can integrate the obtained information, make their interpretation, draw conclusions and formulate opinions	IS_K1_U01	W	C
	2	The student can recognize systemic and non-technical aspects when formulating and solving engineering tasks	IS_K1_U09	P	K L
Social Competence	1	The student correctly identifies engineering problems and can set the priorities of professional activities	IS_K1_K03	P	K L
	2	The student is aware of the proper conduct of water and sewage management in industrial plants.	IS_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)	30	dr hab. inż. Kłosok-Bazan Iwona
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	0
Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Information technology
Nazwa przedmiotu	Technologie informacyjne

ECTS points	2	Subject type	P

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	B.3.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Basic Computer Skills: Proficiency in basic computer operations is essential. Students should be comfortable with tasks such as file management, navigating operating systems like Windows or macOS, and using common software applications.
		2	Knowledge of Text Editing Software: Familiarity with text editing software such as Microsoft Word, Google Docs, or similar programs is necessary. Students should be able to create, edit, and format documents effectively.
		3	Understanding of Graphic Editing Software: Proficiency in graphic editing software like Adobe Photoshop, Illustrator, or GIMP is beneficial. Students should have basic skills in manipulating images, creating graphics, and understanding concepts such as layers and filters.
	Skills	1	Teamwork and Communication Skills: Many IT projects require collaboration with others. Students should have the ability to work effectively in teams, communicate ideas clearly, and collaborate on projects.
		2	English Language Proficiency: If the course is conducted in English, a sufficient level of English language proficiency is necessary to understand lectures, instructions, and technical documentation.
		3	Attention to Detail: Information Technology often involves working with complex systems where attention to detail is crucial for accurate problem-solving and programming.
		4	Analytical Thinking: Students should possess analytical thinking skills to understand and interpret technical information, analyze data, and make informed decisions in various IT-related scenarios.
	Social Competence	1	it is not required
		2	

Course Goals	Providing basic information on information technology

Programme content Introduction to IT Fundamentals: Understanding the basic concepts and principles of Information Technology, including hardware, software, networks, and cybersecurity. Computer Systems and Software Applications: Learning about computer systems architecture, operating systems, and common software applications used in various fields. Data Management and Analysis: Exploring techniques for data organization, storage, retrieval, and analysis using databases and spreadsheet 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 an advanced knowledge of the construction of computers and computer networks	IS_K1_W02	W	C D
	2	A student he knows electronic documents and has knowledge about their construction.	IS_K1_W02	W L	C D L P
	3	Knowledge of legal aspects of using information	IS_K1_W15	W	D O
Skills	1	Creating, presenting, transmitting, acquiring information	IS_K1_U02	L	N O
	2	The ability to select IT tools to perform their own tasks	IS_K1_U03	L	N O
	3	A student can use internet services. He can search for information	IS_K1_U01	L	N O
Social Competence	1	A student understands the need for continuous training, raising professional competences and can organize the learning process of other people	IS_K1_K01	W	C D
	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. Pochwała Sławomir
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	4
Examination or final colloquium	1
Additional contact hours	0
Total student workload	50
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Materials science
Nazwa przedmiotu	Materiałoznawstwo

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

Course code	A.10	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Student has basic knowledge of physics and chemistry
		2	
	Skills	1	Student an obtain information from literature
		2	
	Social Competence	1	Student understands the need to learn
		2	A student is aware of the need to improve their knowledge throughout life and is able to select the appropriate learning methods for themselves and others

Course Goals To acquaint students with the construction of materials

Programme content It covers various aspects such as crystal structure, physical and mechanical properties, metallic materials, plastics, ceramic materials, composites, corrosion and selected special materials.

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 relevant knowledge of the structure of materials and its effect on properties	IS_K1_W07	W	C
	2				
Skills	1				
	2				
Social Competence	1	A student understands the need for further training and is able to plan and implement lifelong learning independently and to critically appraise his/her knowledge	IS_K1_K01	W	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 Andrzejewski Dariusz
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	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

dr hab. inż. Małecka Joanna
Head of the organizational unit
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Mathematics for engineers
Nazwa przedmiotu	Matematyka dla inżynierów

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

Course code	A.1.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Students know basic algebraic concepts and symbols of mathematical logic and theory of sets.
		2	Students know fundamental functions.
		3	Students know the definition of the limit of a numerical sequence, the limit of a function and continuity of a function.
	Skills	1	The ability to abstractional and logical thinking.
		2	The ability to perform basic algebraic calculations.
	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 Differential calculus of one variables functions and its applications, indefinite integrals and methods of their calculation, definite integrals and their application to solving geometric problems, and improper integrals will be discussed during the lectures and exercises.

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 one variable functions and its application.	IS_K1_W01	W	A
	2	Students have knowledge with regard to integral calculus of one variable functions.	IS_K1_W01	W	A
	3	Students know English terminology used in mathematics.	IS_K1_W17	W	A
Skills	1	Students are able to calculate the derivative of a function.	IS_K1_U06	C	C E F P
	2	Students are able to calculate indefinite integrals by selecting appropriate calculation methods.	IS_K1_U06	C	C E F P
	3	Students are able to calculate definite integrals and apply them to solve geometric problems.	IS_K1_U06	C	C E F P
	4	Students are able to use mathematical terminology in English.	IS_K1_U04	C	C E F P
Social Competence	1	Students are even more aware of the need for continued training, in particular, in methods of modern mathematics used in the technology.	IS_K1_K01	W	A
	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. Ścięgosz Hanna
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	35
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr Koziarska Anna
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Mechanical operations in industrial installations
Nazwa przedmiotu	Operacje mechaniczne w instalacjach przemysłowych

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

Course code	E.11.	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 fluid mechanics
		2	The student has knowledge regarding industrial technologies and equipment
	Skills	1	The student acquires information from literature, databases, and other sources, and analyzes them to draw conclusions
		2	The student accurately identifies engineering problems
	Social Competence	1	The student understands the need for further education and the enhancement of professional competencies
		2	The student has the ability to work in teams and communicate effectively

Course Goals The aim of the course is to familiarize students with mechanical operations used in industrial installations.

Programme content The course content includes learning about mechanical operations such as size reduction, separation, filtration, fluidization, and mixing. Physical properties of single and multicomponent real substances will be discussed, along with the scope and methodology of calculating industrial pipelines.

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 processes of environmental engineering	IS_K1_W09	W C L P	C H I K L P
	2	Student has advanced knowledge of design and calculation of process apparatuses	IS_K1_W02	W C L P	C H I K L P
Skills	1	Student is able to identify and formulate practical engineering tasks related to process engineering	IS_K1_U11	C P	C H I K L P
	2	Student is able to carry out simple research tasks, calculation connected with process engineering	IS_K1_U12	L	H P
Social Competence	1	Student understands the need to learn and implement the lifelong learning process and critically assess their own knowledge	IS_K1_K01	W C L P	C H I K L P
	2	Student correctly identifies engineering problems and can solve practical problems	IS_K1_K03	L P	H K L 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 hab. inż. Wzorek Małgorzata
Calculation class (C)	15	
Laboratory class (L)	15	
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)	15
Laboratory class (L)	15
Project (P)	15
Seminar (S)	0
Preparation for classes	8
Preparation of a report/paper/ project/presentation	7

Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	75

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Mechanical operations in sanitary installations
Nazwa przedmiotu	Operacje mechaniczne w instalacjach sanitarnych

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

Course code	E.11.	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 fluid mechanics
		2	The student has knowledge regarding industrial technologies and equipment
	Skills	1	The student acquires information from literature, databases, and other sources, and analyzes them to draw conclusions
		2	The student accurately identifies engineering problems
	Social Competence	1	The student understands the need for further education and the enhancement of professional competencies
		2	The student has the ability to work in teams and communicate effectively

Course Goals The aim of the course is to familiarize students with mechanical operations used in sanitary installations.

Programme content The course content includes learning about mechanical operations such as gravitational phase separation, filtration, and liquid phase mixing. Principles of slurry and suspension pumping, hydraulic transport, as well as the scope and methodology of calculating flow installations 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 about methods and devises used in process engineering	IS_K1_W09	W C L P	C H I K L P
	2	Student has advanced knowledge of methods and tools used for engineering design	IS_K1_W02	W C L P	C H I K L P
Skills	1	Student is able to identify and formulate practical engineering tasks related to process engineering	IS_K1_U11	C P	C H I K L P
	2	Student is able to carry out simple research tasks concerning with methods typical of process engineering in accordance with the provided specification	IS_K1_U12	L	H P
Social Competence	1	Student understands the need to learn and lifelong learning	IS_K1_K01	W C L P	C H I K L P
	2	Student correctly identifies engineering problems can solve it	IS_K1_K03	L P	H K L 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 hab. inż. Wzorek Małgorzata
Calculation class (C)	15	
Laboratory class (L)	15	
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)	15
Laboratory class (L)	15
Project (P)	15
Seminar (S)	0
Preparation for classes	8
Preparation of a report/paper/ project/presentation	7
Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	75

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Second
Course Title	Mechanics
Nazwa przedmiotu	Mechanika ogólna

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

Course code	A.11.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student knows the fundamentals of mathematics and vector analysis
		2	Fundamentals of Physics
	Skills	1	A student is able to apply knowledge of mathematics
		2	
	Social Competence	1	A student recognizes the need for, and an ability to engage in life-long learning
		2	A student is able to think independently.

Course Goals The aim of subject is apply the principles of mechanics to practical engineering problems.

Programme content Problems of statics. Equations of equilibrium. Determinations of reactions and internal forces in structural members.

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 is able to use FBD concept to define equilibrium equations and find the unknown reaction in constraints.	IS_K1_W07	W C	C I
	2	A student is able to define fundamental concepts of mechanics and apply fundamental equations of equilibrium.	IS_K1_W07	W C	C I
Skills	1	A student is able to solve standard engineering structures subjected to static loads.	IS_K1_U11	C	C I
	2				
Social Competence	1	A student is able to analyse engineering problems and solve them effectively.	IS_K1_K03	W C	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)	15	dr inż. Marciniak Zbigniew
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	20
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	23
Examination or final colloquium	2
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Methods of the impact of industry on the environment
Nazwa przedmiotu	Metody oceny oddziaływania przemysłu na środowisko

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

Course code	E.9.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student knows environmental pollution
		2	
	Skills	1	A student has the ability to analyze data
		2	
	Social Competence	1	A student understands the need for further education and improvement of professional competences.
		2	A student understands the social role of an engineer and the need providing the public with reliable information regarding engineering achievements.

Course Goals Providing knowledge regarding methods used to assess the impact of industry on the environment. Developing the ability to analyze data on environmental threats, risk factors, and selecting research methods for the correct assessment of the industry's impact on the environment.

Programme content The subject provides knowledge on issues related to environmental assessment methods. As part of the module, the student acquires knowledge and skills in analyzing available data about the production process and methods of assessing the impact on individual environmental components. The acquired knowledge allows to identify industrial threats and select the best possible technologies to reduce the impact of industry on the environment.

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 of legal acts and rules related to the impact of objects on the environment.	IS_K1_W13	W P	C K L
	2	Student has knowledge necessary to understand the complexity of engineering activities and many factors affecting it.	IS_K1_W14	W P	C K L
Skills	1	Student finds methods and arguments to communicate in a professional and social environment.	IS_K1_U02	P	K L
	2	Student can critically analyze the methods of enterprises' operation and assess technical solutions used in environmental engineering.	IS_K1_U10	P	K L
Social Competence	1	Student is able to think and act in an innovative way and looks for methods of assessing the impact of industry on the environment.	IS_K1_K05	W P	C K L
	2	Student has a sense of responsibility for the effects of his professional activity, especially in the context of its impact on the natural environment.	IS_K1_K02	W P	C K L

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. Król 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	10
Preparation of a report/paper/ project/presentation	10
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)	60

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
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Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Municipal energy management			
Nazwa przedmiotu	Komunalna gospodarka energetyczna			
ECTS points	6	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Examination
Course code	E.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)		T

Preliminary requirements of the course	Knowledge	1	Basic concepts related to energy, such as energy sources, energy consumption, energy efficiency and sustainability.
		2	Basic knowledge of the structure and functioning of the public sector, including local government bodies and their role in energy management.
	Skills	1	Student is able to think logically and analyze data related to energy consumption and energy efficiency.
		2	Student knows how to identify various energy resources, technologies and systems used in the public sector.
	Social Competence	1	Student properly identifies engineering problems and is able to set priorities for professional activities.
		2	Student is aware of the importance and understands the non-technical aspects and effects of engineering activities, including its impact on the functioning of the commune.

Course Goals Preparing students to solve practical problems of energy management in municipalities, with particular emphasis on municipal resources management.

Programme content Issues of energy management in the context of cities and municipalities. The role of the public sector in the efficient use of energy. Methods for analyzing and monitoring energy consumption in the municipal sector. Collection and interpretation of data related to energy consumption in public buildings, street lighting systems, public transportation, and other areas. Analysis of specific cases of energy management strategies in cities

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 sufficient knowledge about the construction and operation of residential buildings, industrial facilities and municipal infrastructure for engineering needs.	IS_K1_W10	W	A
	2	Student knows the principles of rational energy management in the municipality to an advanced degree.	IS_K1_W12	W	A
	3	Student has the knowledge necessary to understand the social, economic, legal, technical and non-technical determinants of energy management in municipal resources.	IS_K1_W14	W C P	A C G K L M O
Skills	1	Student has the necessary preparation to work in the municipal energy sector.	IS_K1_U07	C P	K L M O
	2	Student understands system and non-technical aspects in formulating and solving energy management issues in the municipality and its resources.	IS_K1_U09	P	G K L M O
	3	Student is able to identify and formulate simple engineering tasks of a practical nature related to energy resources in the municipality.	IS_K1_U11	P	K L M O
Social Competence	1	Student has a sense of responsibility for the results and effects of his professional activity, especially in the context of its impact on the proper management of energy in municipal resources.	IS_K1_K02	W P	A K L M O
	2	Student understands the importance of teamwork in the municipal economy.	IS_K1_K05	W P	A K L M O
	3	Student thinks and act creatively, innovatively and practically in the field of energy management in the municipal sector,	IS_K1_K05	W P	K L M 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. Tańczuk Mariusz
Calculation class (C)	15	
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)	15
Laboratory class (L)	0
Project (P)	30
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	30
Independent study of the course topics	16
Examination or final colloquium	4
Additional contact hours	0
Total student workload	150
Number of contact hours (from the study plan)	75

* hour (class) means 45 minutes

dr hab. inż. Hapanowicz Jerzy
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Seventh		
Course Title	Municipal recycling		
Nazwa przedmiotu	Recykling w gospodarce komunalnej		
ECTS points	4	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit

Course code	E.10.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has knowledge of the basics of waste management
		2	
	Skills	1	A student has the ability to analyze data
		2	
	Social Competence	1	Readiness for comprehensive analysis and effective implementation of assigned tasks
		2	

Course Goals Providing knowledge about waste recycling processes. Getting to know the basic methods of assessing the properties of waste and developing the ability to search for and select appropriate recycling methods.

Programme content The subject provides knowledge about waste recycling processes. During the module, the student acquires knowledge and skills in the field of waste identification and selection of recycling methods. The acquired knowledge allows it to be applied in engineering practice.

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 appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines and strength of materials to a degree needed to understand the principles of operation and construction of devices.	IS_K1_W07	W	C I J
	2				
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	IS_K1_U01	C	I J
	2	Student has the preparation necessary to work in industry and knows the rules of occupational safety and health	IS_K1_U07	C	I J
Social Competence	1	Student correctly identifies engineering problems and is able to prioritise professional activities and recognises the importance of knowledge in solving cognitive and practical problems	IS_K1_K03	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	dr hab. inż. Król Anna
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	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 hab. inż. Hapanowicz Jerzy
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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	B.1.2	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	A 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	A 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	A student understands the need for lifelong learning, broadening knowledge, and knows the possibilities of further education.		C	R
	2	A 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
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental 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	B.1.1	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	A 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	A 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	A student understands the need for lifelong learning, broadening knowledge, and knows the possibilities of further education.		C	R
	2	A studente 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. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering

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

Course Title	Physics for engineers
Nazwa przedmiotu	Fizyka dla inżynierów

ECTS points	4	Subject type	P
Language of lecture	angielski	Mode of completing the course	Examination

Course code	A.2.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	The student has knowledge of physics from secondary school, knows the concepts and quantities used to describe physical phenomena, knows methods of solving simple problems using physical laws and relationships.
		2	The student has well-established knowledge of secondary school mathematics and knowledge of mathematical analysis and analytical geometry (1-st year of studies), including vector calculus, geometry, differential and integral calculus.
	Skills	1	The student is able to discuss and describe the phenomenon using previously learned physical concepts and terms, and is able to plan and carry out a simple experiment using physical laws, principles and a mathematical apparatus that does not take into account differentiation and integration.
		2	Performs basic operations on vectors on a plane using geometric devices and is able to perform them independently using analytical methods, is able to integrate functions of one variable, differentiate functions of many variables, provide geometric interpretation of results and uses basic software for serial calculations, e.g. Excel .
	Social Competence	1	The student understands the need for his/her own development, including expanding knowledge of physics, as a science that shapes the skills of an engineering perspective on tasks and processes in environmental engineering.
		2	

Course Goals 1. Acquiring knowledge about selected physical phenomena applicable in environmental engineering. 2. Developing practical skills in using knowledge of physics by performing laboratory exercises and documenting the results in the form of reports. 3. Ability to verify results, estimate and calculate the uncertainty of physical quantities obtained directly and indirectly.

Programme content The course provides knowledge on methods for estimating the uncertainty of physical quantities determined directly and indirectly. The acquired knowledge in the field of sound waves allows for the quantitative description and analysis of phenomena necessary in characterizing acoustic processes, including noise. Learning the basics of gravity and elements of the theory of relativity allows for a proper assessment of the factors that determine the functioning of the environment. Understanding some quantum-optical phenomena and the basics of the structure of matter at the microscopic level provides the opportunity to understand the operation of devices using these phenomena, e.g. nuclear power plant (in the production of energy from the atom) or the laser beam modul (in the production of computer processors).

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 the laws of gravity allowing for the cause-and-effect characterization of phenomena.	IS_K1_W01	W L	A P
	2	A student has knowledge of how to characterize the loudness level of sounds.	IS_K1_W01	W	A
	3	A student knows selected quantum-optical phenomena and understands the basics of the structure of microscopic matter.	IS_K1_W01	W L	A P
	4	A student knows the phenomena underlying the production of energy from the atom. It properly assesses the advantages and disadvantages of producing this type of energy.	IS_K1_W01	W	A
	5	A student has knowledge of international standards for estimating measurement uncertainty.	IS_K1_W01	W L	A H
	6	A student knows methods of measuring some physical quantities.	IS_K1_W01	L	P
	7	A student knows the principles of work organization and health and safety regulations typical for multi-team laboratory rooms.	IS_K1_W03	L	P
Skills	1	A student is able to characterize physical processes describing physical phenomena, as well as identify cause and effect relationships.	IS_K1_U01	L	H P
	2	A student is able to plan and carry out physical experiments.	IS_K1_U01	L	H P
	3	A student able to operate selected measuring instruments.	IS_K1_U01	L	P
	4	A student is able to prepare a report on the measurements performed, verifying the obtained results and estimating uncertainties.	IS_K1_U06	L	H
Social Competence	1	A student understands the need to expand knowledge and skills in the field of physics to describe selected engineering issues in energy and environmental engineering.	IS_K1_K01	W	A
	2	A student recognizes the advantages of teamwork and the need to assume different roles.	IS_K1_K05	L	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 Kostrzewa Marek
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	13
Preparation of a report/paper/ project/presentation	50
Independent study of the course topics	10
Examination or final colloquium	2
Additional contact hours	0
Total student workload	120
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. Kozdraś Andrzej
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Professional practice		
Nazwa przedmiotu	Praktyka zawodowa		
ECTS points	6	Subject type	W-PR
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	G.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Understanding of risk assessment methodologies and techniques for identifying, assessing, and managing environmental risks.
		2	Knowledge of fundamental environmental concepts including pollution, sustainability, conservation, and environmental regulations.
		3	Familiarity with methods and instruments used for environmental monitoring such as air quality monitoring, water quality analysis, soil sampling, and noise monitoring.
		4	Understanding of waste management principles, including waste reduction, recycling, treatment, and disposal methods.
		5	Basic knowledge of water and wastewater treatment processes, technologies, and systems for pollution control and water resource management.
	Skills	1	Ability to communicate effectively and prepare reports on environmental issues, findings, and recommendations for diverse audiences.
		2	
	Social Competence	1	Ability to collaborate effectively with colleagues, stakeholders, and professionals from diverse backgrounds to achieve common goals in environmental projects.
		2	Strong verbal and written communication skills to convey ideas, discuss findings, and present project outcomes to various audiences clearly and effectively.
		3	Flexibility and willingness to adapt to changing work environments, project requirements, and emerging challenges in the field of environmental engineering.

Course Goals The aim of the practice is to get acquainted with the way of functioning and the business profile of an enterprise (institution) in the area of solving technical problems resulting from planning and conducting real industrial processes related to the broadly understood environmental engineering. The scope of the practice includes familiarization with design and construction issues and conditions for the operation of machines and devices in connection with the problems of designing technological systems, as well as learning the techniques and ways of processing raw materials, substances and energy in the aspects of environmental engineering.

Programme content Internships within studies primarily focus on the role of environmental engineers, ethical standards, regulations, advanced monitoring techniques, project management, communication, case studies, ethics, professional development, and career planning in environmental engineering.

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 principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering	IS_K1_W03	P	H R
	2	Student has specialist and systematic knowledge of the role of the natural environment, is aware of environmental hazards	IS_K1_W06	P	H R
	3	Student has appropriate knowledge in the field of process observation and knows methods of quality control and issues of standardization of installation and network components, important from the point of view of environmental engineering	IS_K1_W09	P	H R
	4	Student has knowledge sufficient for engineering needs about the construction and operation of equipment and industrial apparatus used in environmental engineering	IS_K1_W10	P	H R
Skills	1	Student is able to use various techniques to communicate in professional and social environments	IS_K1_U02	P	H R
	2	Student has the preparation necessary to work in environmental engineering field and knows the rules of occupational safety and health	IS_K1_U07	P	H R
	3	Student is able to use measuring apparatus in environmental engineering	IS_K1_U08	P	H R
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity in environmental engineering	IS_K1_K02	P	H R
	2	Student is able to prioritise professional activities	IS_K1_K03	P	H R
	3	Student is aware of the importance of professional conduct	IS_K1_K04	P	H R
	4	Student understands the social role of an engineer	IS_K1_K06	P	H 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. Pochwała Sławomir
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

dr hab. inż. Kłosok-Bazan Iwona
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dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Protection of intelectual property		
Nazwa przedmiotu	Ochrona własności intelektualnej		
ECTS points	2	Subject type	HS
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	B.5.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	A student understands the need for further education and is able to plan and implement the learning process on their own
		2	

Course Goals To acquaint students with the principles of legal protection of various forms of intellectual and industrial property

Programme content The subject covers basic knowledge concerning the legal protection of objects of industrial property and works, the non-infringement of others' exclusive rights in business activities, the legal use of industrial property and copyright and the creation of innovative attitudes.

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 understands copyright and patent concepts and principles; knows and understands the fundamental dilemmas of modern civilisation	IS_K1_W15	W	D
	2				
Skills	1	A student has the preparation necessary to work in industry in the field of law protection	IS_K1_U07	W	D
	2				
Social Competence	1	A student understands the social role of the engineer and in the correct way can assess the situation in the field of protection of intellectual property rights	IS_K1_K06	W	D
	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. Kłosok-Bazan Iwona
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	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

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Sanitary Chemistry
Nazwa przedmiotu	Chemia sanitarna

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

Course code	D.12.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	The student understands the need for further education and competence development
		2	

Course Goals Prepare students to work in chemical laboratories associated with the identification of contaminants in water and wastewater

Programme content Sources, forms of occurrence, causes of anomalous concentrations and methods of determining admixtures and contaminants in water and wastewater and their toxicity and effects on water quality and human health.

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 observation of phenomena and processes that is appropriate for their studies and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental engineering from the point of view of sanitary chemistry	IS_K1_W09	W L	A E J
	2				
Skills	1	Student is able to carry out simple research tasks concerning broadly understood environmental protection technologies and design and construct a device, facility, system or process typical of environmental engineering in accordance with the provided specification	IS_K1_U12	W L	A E J
	2				
Social Competence	1	Student has a sense of responsibility for the results and consequences of their professional activity, particularly in the context of its impact on the natural environment	IS_K1_K02	W L	A E 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	dr hab. inż. Kłosok-Bazan Iwona
Calculation class (C)	15	
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)	15

Laboratory class (L)	15
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 hab. inż. Kłosok-Bazan Iwona
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Strength of materials
Nazwa przedmiotu	Wytrzymałość materiałów

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

Course code	A.11.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	A student knows mathematics, physics and mechanics.
		2	
	Skills	1	A student is able to apply knowledge of mechanics
		2	A student is able to apply knowledge of math
	Social Competence	1	A student is able to describe and identify physical phenomena
		2	

Course Goals The aim of subject is to give an ability to apply the knowledge of strength of materials on engineering applications and design problems.

Programme content Problems related to calculating stresses and deformations of structural 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 is able to apply knowledge of the strength of materials to design structural members.	IS_K1_W07	W C L	C H
	2				
Skills	1	A student is able to determine materials basic properties using experimental tests, and stress and strain state.	IS_K1_U01	W C L	C H J
	2	Student is able to determine the basic mechanical properties of structural materials	IS_K1_U06	L	C H J
Social Competence	1	A student recognizes the need for, and an ability to engage in life-long learning. Student is able to select the appropriate learning methods for themselves and others.	IS_K1_K04	W C L	J P
	2	A student provokes to critical analysis in the solution of a problem and application to engineering.	IS_K1_K01	W L	H 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 inż. Marciniak Zbigniew
Calculation class (C)	15	
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)	15
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	18
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	20
Examination or final colloquium	2
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. Kluger Krzysztof
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	First		
Course Title	Technical metrology		
Nazwa przedmiotu	Metrologia techniczna		
ECTS points	3	Subject type	K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	D.13.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Mathematics covering algebra, mathematical analysis, and statistics.
		2	Physics covering optics.
		3	Basic knowledge of technical drawing.
	Skills	1	A student has the ability for self-education.
		2	A student can gather information from literature, databases, and other sources.
	Social Competence	1	A student is aware of the necessity for lifelong learning.
		2	A student can collaborate and operate within a group, assuming various roles within it.

Course Goals Introducing students to measurement methods.

Programme content Basic concepts - information, observation, measurable and immeasurable quantities, measurement, values, units of measurement.

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 appropriate knowledge of metrology	IS_K1_W09	W C	C I
	2	A student knows the methods of measuring the basic values characteristic for the construction of machines	IS_K1_W09	W C	C I
	3	A student knows the calculation methods necessary to analyze the measurement results	IS_K1_W09	W C	C I
Skills	1	A student can use methods to estimate measurement errors	IS_K1_U08	C	C I
	2				
Social Competence	1	A student is aware of the need for lifelong learning	IS_K1_K01	W C	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)	15	dr inż. Borsuk Grzegorz
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	10
Independent study of the course topics	18
Examination or final colloquium	2
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Third
Course Title	Technical thermodynamics

Nazwa przedmiotu	Termodynamika techniczna		
ECTS points	5	Subject type	P
Language of lecture	angielski	Mode of completing the course	Examination
Course code	A.8.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Fundamentals of chemistry topics including atomic structure, chemical bonds, chemical reactions, properties of substances, etc.
		2	Basic knowledge of thermal physics
		3	Good understanding of mathematics, including algebra, and differential and integral calculus
	Skills	1	Solving equations, systems of equations, and differential and integral equations
		2	Balancing chemical equations
		3	Solving basic problems in work and energy
	Social Competence	1	Clear and effective communication
		2	Creative thinking and action
		3	Ability to work effectively in a team

Course Goals - broadening knowledge of fundamental laws of thermodynamics, - mastering and understanding topics related to the analysis of energy transformations in heat engines, - ability to apply thermodynamic principles to practical applications and solve engineering problems.

Programme content The course includes an introduction to fundamental concepts and principles of thermodynamics, analysis of thermodynamic cycles, and their applications in selected devices and energy systems. The subject will focus on applying thermodynamic principles to analyze and evaluate the efficiency of energy systems, considering environmental aspects and energy efficiency.

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 extended knowledge of thermodynamics, including the knowledge necessary for modelling and analysis of thermal and flow phenomena.	IS_K1_W01	W C L	A H J P R
	2				
Skills	1	The student is able to obtain information from literature and databases. The student is able to integrate them, as well as draw conclusions concerning thermodynamic phenomena.	IS_K1_U01	C L	A H J P R
	2				
Social Competence	1	The student understands the role of an engineer as a person who is required to have appropriate knowledge of technical phenomena.	IS_K1_K06	W C L	A H 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. Junga Robert
Calculation class (C)	30	
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)	30
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	12

Preparation of a report/paper/ project/presentation	18
Independent study of the course topics	18
Examination or final colloquium	2
Additional contact hours	0
Total student workload	125
Number of contact hours (from the study plan)	75

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
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dr inż. Wydrych Jacek
Dean of Faculty
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Technologies and industrial apparatus
Nazwa przedmiotu	Technologie i urządzenia przemysłowe

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

Course code	D.12.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	He has a general knowledge of the world, the environment and the processes occurring in it.
		2	
	Skills	1	The student acquires information from literature and other sources related to technical sciences.
		2	
	Social Competence	1	The student can think and act in a creative way.
		2	

Course Goals The purpose of the course is to provide students with knowledge of technologies used in various industries, and to familiarize them with the principle of operation, areas of application and operational parameters of industrial equipment.

Programme content In the course, students gain knowledge of the technologies used in various industries, as well as the principles of operation and areas of application of selected industrial equipment. Students are familiarized with examples of devices used in mechanical operations, heat and mass transfer processes across various industries. Additionally, it aims to impart knowledge about devices used for storing, transporting, and processing different substances. This subject enables students to learn about the latest technological developments and to understand organisational and operational issues related to industrial 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 appropriate knowledge of mechanics, fluid mechanics, material science and theory of machines to a degree needed to understand the principles of operation and construction of devices used in industry.	IS_K1_W07	W	C
	2	A student has the knowledge necessary to understand technical and non-technical aspects of engineering activity in relation to technology and industrial apparatus.	IS_K1_W14	W	C
Skills	1				
	2				
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge in the field of technology and industrial devices.	IS_K1_K01	W	C
	2	The student recognizes the significance of professional conduct, adherence to ethical standards, and respect for diverse views and opinions regarding technology and industrial equipment.	IS_K1_K04	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 inż. Płaczek Małgorzata
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	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 Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Fifth		
Course Title	Thermal and diffusion processes in industrial installations		
Nazwa przedmiotu	Procesy cieplne i dyfuzyjne w instalacjach przemysłowych		
ECTS points	4	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Examination
Course code	E.5.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has a basic knowledge of thermodynamics, fluid mechanics and mechanical engineering.
		2	
	Skills	1	Student is able to analyze information obtained from various sources and conduct process calculations.
		2	
	Social Competence	1	Student understands the need for further education.
		2	The student understands the social role of an engineer, recognizing their responsibility in addressing societal needs, contributing to the advancement of technology, and promoting sustainable development.

Course Goals The aim of the course is to provide comprehensive knowledge regarding the utilization of thermal and diffusion processes within various devices and industrial installations.

Programme content The subject provides knowledge on thermal and diffusion processes, as well as operational parameters for equipment commonly used in various branches of industry. Within this module, students acquire knowledge and skills essential for calculating, designing installations and selecting proper equipment, identifying operational issues in industrial systems operating under thermal and diffusion regimes. The knowledge acquired allows students to apply a systemic approach to ensure the continuity and safety of processes, thereby fostering a sense of responsibility for the reliable operation of designed devices and installations.

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 concerning heat and mass transfer processes used in industry.	IS_K1_W01	W C P	A C L
	2	Student knows the construction and operation of basic industrial devices where heat and mass transfer operations takes place.	IS_K1_W07	W C P	A C L
Skills	1	Student is able to analyze a typical engineering task in the field of heat and mass transfer.	IS_K1_U11	C P	C L
	2	Student is able to design a simple device in which the process of heat and mass transfer is carried out.	IS_K1_U12	C P	C L
	3	Student uses computer tools and methods to solve engineering tasks in the field of heat and mass transfer operations.	IS_K1_U03	C P	C L
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge.	IS_K1_K01	W C P	L P R
	2	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork.	IS_K1_K05	W C P	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)	15	dr inż. Płaczek Małgorzata
Calculation class (C)	15	
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)	15
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	25
Independent study of the course topics	5
Examination or final colloquium	2
Additional contact hours	0
Total student workload	102
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Thermal and diffusion processes in sanitary installations
Nazwa przedmiotu	Procesy cieplne i dyfuzyjne w instalacjach sanitarnych

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

Course code	E.5.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student has a basic knowledge of thermodynamics, fluid mechanics and mechanical engineering.
		2	
	Skills	1	Student is able to analyze information obtained from various sources and conduct process calculations.
		2	
	Social Competence	1	The student recognizes the necessity for continuous education and personal development.
		2	The student understands the social role of an engineer, recognizing their responsibility in addressing societal needs, contributing to the advancement of technology, and promoting sustainable development.

Course Goals The aim of the course is to provide comprehensive knowledge regarding the use of thermal and diffusion processes in various industrial devices and installations.

Programme content The subject provides knowledge on thermal and diffusion processes, as well as operational parameters for equipment commonly used in various branches of industry. Within this module, students acquire knowledge and skills essential for calculating, designing installations and selecting proper equipment, identifying operational issues in industrial systems operating under thermal and diffusion regimes. The knowledge acquired allows students to apply a systemic approach to ensure the continuity and safety of processes, thereby fostering a sense of responsibility for the reliable operation of designed devices and installations.

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 concerning heat and mass transfer processes used in industry.	IS_K1_W01	W C P	A C L
	2	Student knows the construction and operation of basic industrial devices where heat and mass transfer operations takes place.	IS_K1_W07	W C P	A C L
Skills	1	Student is able to analyze a typical engineering task in the field of heat and mass transfer.	IS_K1_U11	C P	C L
	2	Student is able to design a simple device in which the process of heat and mass transfer is carried out.	IS_K1_U12	C P	C L
	3	Student uses computer tools and methods to solve engineering tasks in the field of heat and mass transfer operations.	IS_K1_U03	C P	C L
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge.	IS_K1_K01	W C P	L P R
	2	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork.	IS_K1_K05	W C P	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)	15	dr inż. Płaczek Małgorzata
Calculation class (C)	15	
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)	15
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	25
Preparation of a report/paper/ project/presentation	25
Independent study of the course topics	5
Examination or final colloquium	2
Additional contact hours	0
Total student workload	102
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Underground infrastructure
Nazwa przedmiotu	Infrastruktura podziemna

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

Course code	E.7.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge of thermodynamics and understands principles of operation of machines and devices used in environmental engineering.
		2	
	Skills	1	A student is able to make a critical analysis of the functioning and assess existing technical solutions.
		2	
	Social Competence	1	A student understands the importance of providing safe working conditions.
		2	

Course Goals Preparing students to use the technologies used in the design and works related to earthwork installation works.

Programme content Familiarizing students with the stages of the investment process, including: components of the construction (execution) design, design documentation as the basis for organizing installation works. Discussion of technology and legal procedures related to carrying out underground installation works in relation to water, gas and sewage 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	A student has sufficient knowledge of engineering and construction of municipal infrastructure.	IS_K1_W10	W P	C K L
	2				
Skills	1	A student obtains information from literature, databases and other sources related to technical sciences.	IS_K1_U01	P	K L
	2				
Social Competence	1	A student understands the need to learn and improve professional skills.	IS_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)	30	dr inż. Prażnowski Krzysztof
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	30
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	25
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. Augustynowicz Andrzej
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Seventh
Course Title	Vehicle recycling
Nazwa przedmiotu	Recykling w motoryzacji

ECTS points	4	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit

Course code	E.10.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	A student has basic knowledge about the role of the natural environment, is aware of hazards and knows the methods of their identification.
		2	
	Skills	1	A student can prepare and present an oral presentation in Polish concerning the issues of vehicle recycling
		2	A student is able to make an initial analysis of the functioning and evaluation of existing technical solutions used in recycling vehicles
	Social Competence	1	A student correctly identifies basic engineering problems and can set priorities for professional activities
		2	

Course Goals To acquaint students with the problems of proper, material and energy recovery on the example of motor vehicles.

Programme content As part of the course, knowledge is provided in the field of materials used in the construction of the vehicle, their life cycle and the possibility of reuse. The student acquires knowledge in the field of material identification, selection and processing methods. They will also learn about the economic side of the issue of disposal of motor vehicles.

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 principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering	IS_K1_W03	W C	C D
	2	Student has specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them	IS_K1_W06	W C	C D O
	3	Student has advanced knowledge of the principles of rational energy, waste and wastewater management as well as heat transfer and energy conversion	IS_K1_W12	W C	C D O
Skills	1	Student is able to see systemic and non-technical aspects while formulating and solving engineering tasks	IS_K1_U09	C	D O
	2	Student is able to conduct a critical analysis of functioning and evaluate the existing technical solutions used in environmental engineering and conduct preliminary economic analysis for undertaken engineering activities	IS_K1_U10	C	D O
Social Competence	1	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	IS_K1_K05	C	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. Hetmańczyk Ireneusz
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	30
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)	45

* hour (class) means 45 minutes

dr hab. inż. Augustynowicz Andrzej
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Waste management
Nazwa przedmiotu	Gospodarka odpadami

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

Course code	D.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student knows and understands waste management basic problems.
		2	
	Skills	1	The student is able to identify problems in engineering field.
		2	
	Social Competence	1	The student is able to analyze complex data affecting waste management problems.
		2	

Course Goals The aim is to familiarize students with basics of waste management, basic techniques and strategic objectives in waste management. Developing skills and competences in the field of proper waste management planning.

Programme content The subject provides knowledge on issues related to waste management. During the module, the student acquires knowledge and skills in planning waste management activities. The acquired knowledge in the identification of processes and systems allows its application in engineering practice.

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 specialized and systematized knowledge about the signification of the natural environment and he knows how to protect it from the harmful effects of humans.	IS_K1_W06	W C	A I J
	2	Student has advanced knowledge necessary to carry out the multi-faceted engineering activities.	IS_K1_W14	W C	A I J
Skills	1	Student can obtain the informations from the literature, analyze them and draw conclusions.	IS_K1_U01	C	I J
	2	Student is able to critically analyze the method of functioning of technical solutions and knows their application in environmental engineering.	IS_K1_U10	C	I J
Social Competence	1	Student has a sense of responsibility for engineering activities.	IS_K1_K02	W C	A I J
	2	Student correctly identifies engineering problems in waste management and can determine the priorities of professional activities.	IS_K1_K03	W C	A 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. Król Anna
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	5
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	13
Examination or final colloquium	2
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 Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic
Level of study	First Cycle Studies
Specialization	
Form of Study	Full-Time Studies
Semester	Sixth
Course Title	Wastewater technology

Nazwa przedmiotu	Technologia ścieków		
ECTS points	2	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination
Course code	D.2.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	basic concepts in biology and chemistry
		2	
	Skills	1	basic skills in solving mathematical equations
		2	basic skills in analysing engineering solutions
	Social Competence	1	A student has ecological awareness and is able to interact and work in a group, and understands the importance of team activities
		2	A student the importance of the problem of wastewater treatment

Course Goals The aim of the subject is to acquire knowledge and skills in the field of wastewater treatment methods and processes.

Programme content Basic qualitative and quantitative wastewater characteristics. Factors affecting the quantity and quality of wastewater production. Calculation of the basic parameters and indicators. Basics of sewage treatment plant design. Conventional biological treatment plants and enhanced removal of biogenic compounds. Theoretical basics of biological removal of nitrogen and phosphorus. The efficiency of operation and pollution removal. Impact on water recipient.

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 specialist and systematic knowledge of the role of the natural environment, is aware of hazards and knows how to identify and reduce them	IS_K1_W06	W	A
	2	Student has the knowledge about wastwater treatment processes and he principles of identification of hazards and occupational health, safety and ergonomics during the construction and operation of installations used in environmental engineering	IS_K1_W04	W L	A F I
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	IS_K1_U01	L	H
	2	Student is able to use various techniques to communicate in professional and social environments. Student is able to use the information and communication technologies necessary to carry out typical engineering activities	IS_K1_U02	L	F H
	3	Student is able to plan and conduct experiments, interpret the obtained results and formulate conclusions using analytical and simulation methods.	IS_K1_U06	L	F H
Social Competence	1	Student understands the need to learn and is able to independently plan and implement the lifelong learning process and critically assess their own knowledge	IS_K1_K01	W	A
	2	Student understands the social role of an engineer and understands the need to provide the public with reliable information on engineering achievements	IS_K1_K06	L	F

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. Boguniewicz-Zabłocka Joanna
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	3
Preparation of a report/paper/ project/presentation	3
Independent study of the course topics	3
Examination or final colloquium	2
Additional contact hours	0
Total student workload	56
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering		
Profile of Education	General Academic		
Level of study	First Cycle Studies		
Specialization			
Form of Study	Full-Time Studies		
Semester	Sixth		
Course Title	Water management and water protection		
Nazwa przedmiotu	Gospodarka wodna i ochrona wód		
ECTS points	3	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	E.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	Student understands the need for further training, raising professional competences
		2	

Course Goals To acquaint students with the principles of water management and technologies for water treatment in industry.

Programme content Regulations, methods and measures for the rational use and protection of water resources in terms of quantity and quality.

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	To an advanced degree, the student has knowledge of water management, knows the basics of water circulation in industry	IS_K1_W12	W P	C K L
	2	The student knows the principles of rational management of water and wastewater and legal guidelines applicable to the	IS_K1_W12	W	C
Skills	1	The student acquires information from literature, databases and other sources related to technical sciences; can integrate the obtained information, make their interpretation, draw conclusions and formulate opinions	IS_K1_U10	W	C
	2	The student can recognize systemic and non-technical aspects when formulating and solving engineering tasks	IS_K1_U01	P	K L
Social Competence	1	The student correctly identifies engineering problems and can set the priorities of professional activities	IS_K1_K02	P	K L
	2	The student is aware of the proper conduct of water and sewage management in industrial plants.	IS_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 hab. inż. Kłosok-Bazan Iwona
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	0
Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Environmental Engineering
Profile of Education	General Academic

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

Course Title	Water system design
Nazwa przedmiotu	Projektowanie instalacji wodnych

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

Course code	D.5.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Fluid Mechanics: Understanding of fluid properties, flow behavior, Bernoulli's equation, pipe flow, and hydraulic principles is essential.
		2	Water Quality: Familiarity with water quality parameters, treatment processes, and regulations related to potable water is important.
		3	Hydraulics: Knowledge of hydraulic principles, including pressure distribution, pipe networks, pumps, and valves, is required for designing efficient water distribution systems.
		4	Pipe Sizing and Design: Ability to size and design pipes based on flow rates, pressure requirements, and other hydraulic considerations.
		5	Water Distribution Networks: Familiarity with network analysis, layout optimization, and design considerations for water distribution networks.
		6	Pumping Systems: Understanding of pump selection, system curves, pump efficiency, and energy consumption in pumping systems.
	Skills	1	Mathematics and Statistics: Basic mathematical and statistical skills for analyzing data, performing calculations, and interpreting results in water system design.
		2	CAD (Computer-Aided Design): Ability to use CAD software for drafting and designing water distribution layouts, pipelines, and related infrastructure.
	Social Competence	1	Ability to work in an interdisciplinary team.
		2	

Course Goals Familiarizing students with the basic principles of operation of sanitary installations. Acquiring the skills of designing simple sanitary installations in buildings.

Programme content Introduction to Water Systems: Understanding the principles and components of water systems, including sources of water, distribution networks, treatment processes, and quality standards. Hydraulic Analysis: Learning about hydraulic principles, pipe flow, pressure distribution, pump selection, and design calculations for efficient water distribution.

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 advanced knowledge of the principles of technical drawing and engineering graphics that enable solving technical problems in the field of environmental engineering	IS_K1_W04	W	A
	2	Student has knowledge of the construction and operation of civil and municipal structures that is sufficient for engineering needs	IS_K1_W10	P	K
Skills	1	Student has self-education skills. Student acquires information from literature, databases and other sources related to technical sciences. Student is able to integrate obtained information, interpret it, draw conclusions and formulate opinions	IS_K1_U01	P	K
	2	Student uses computer software to solve engineering tasks	IS_K1_U03	P	K
Social Competence	1	The student understands the need for further education and is able to independently plan and implement the lifelong learning process, as well as critically evaluate their knowledge	IS_K1_K01	W	A
	2	The student is aware of the importance of professional conduct, adherence to the principles of professional ethics and respect for diversity of views and opinions, and is ready to take care of the achievements and traditions of the engineering profession	IS_K1_K04	P	K

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. Pochwała Sławomir
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	14
Preparation of a report/paper/ project/presentation	15
Independent study of the course topics	0
Examination or final colloquium	1
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kłosok-Bazan Iwona
Head of the organizational unit
(stamp/signature)

dr inż. Wydrych Jacek
Dean of Faculty
(stamp/signature)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Water Technology
Nazwa przedmiotu	Technologia wody

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

Course code	D.2.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	
		2	
	Skills	1	
		2	
	Social Competence	1	A student is able to think creatively and independently draw conclusions.
		2	

Course Goals To acquaint students with technological problems of water production

Programme content Knowledge and skills in water treatment technology, necessary for the selection of methods and design of equipment for the removal of the main types of contaminants from water.

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 observation of phenomena and processes that is appropriate for their studies and knows the methods of making measurements of characteristic quantities that are important from the point of view of environmental engineering	IS_K1_W09	W L	B E
	2				
Skills	1	Student is able to use measuring apparatus and has the ability to estimate errors and assess the suitability of routine methods and tools used to solve a practical engineering task	IS_K1_U08	W L	B E
	2				
Social Competence	1	Student is able to think and act in a creative, innovative and entrepreneurial way and is ready to critically assess their own knowledge, cooperate and work in a team while taking on different roles; understands the importance of teamwork	IS_K1_K05	W L	B E
	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. Kłosok-Bazan Iwona
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	0
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

dr hab. inż. Kłosok-Bazan Iwona
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dr inż. Wydrych Jacek
Dean of Faculty
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Wydział Mechaniczny - lista przedmiotów na kierunku Environmental Engineering - Studia stacjonarne - Studia pierwszego stopnia (od 2024)

symbol	Air protection	Assessment of the nuisance of selected processes	Basic Biotechnology	Basics of technical drawing	Buildings structures	Chemistry for engineers	Circular economy	Computer Aided Design	Computer control techniques	Computer measurement techniques	Costing	Descriptive geometry	Design of sewage installation	Design work - the environmental area	Design work - the industrial area	Differential and integral calculus	Diploma work (engineering project)	Diploma work (engineering project)	Elective module - I: Basis of personal development	Elective module - I: Social Communication	Elective module - II: Economics in micro-business	Elective module - II: History of science	Elective module - III: Law and standards in environmental protection
IS_K1_W01	X	.	X	.	.	X	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.	.	.
IS_K1_W02	X	.	.	.	.	.	.	X	X	X	X	.	X	X	X	.	X	X	.	.	.	.	.
IS_K1_W03	.	X	X	.	.	.	X	.	.	.	.	.	X	.	.	.	.	.	X	.	.	.	.
IS_K1_W04	.	.	.	X	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.
IS_K1_W05	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	X	.	.	.	.	.
IS_K1_W06	.	X	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X
IS_K1_W07	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.
IS_K1_W08	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.
IS_K1_W10	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W12	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W13	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	X	.	.	.	.	X
IS_K1_W14	.	.	.	.	X	.	.	.	.	.	.	.	.	X	X	.	.	X	.	X	.	X	.
IS_K1_W15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
IS_K1_W16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
IS_K1_W17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.
IS_K1_U01	.	.	X	.	.	.	X	.	.	.	X	X	.	X	X	.	X	X	.	.	.	.	.
IS_K1_U02	.	.	.	X	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U03	.	.	.	.	.	.	.	X	.	X	X	.	X	.	.	.	.	.	.	.	.	.	.
IS_K1_U04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.
IS_K1_U05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U06	X	.	.	.	.	X	.	.	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.
IS_K1_U07	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
IS_K1_U08	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U09	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.
IS_K1_U10	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U11	.	.	X	X	.	X	.	.	.	.	.	.	X	.	.	.	X	X	.	.	.	.	.
IS_K1_U12	.	X	X	.	.	.	X	.	.	.	.	.	X	X	X	.	.	X	.	.	.	.	.
IS_K1_K01	X	.	X	.	X	X	.	X	.	.	.	X	.	X	X	X	.	.	X	.	.	.	X
IS_K1_K02	X	.	.	X	.	.	X	.	.	.	X	.	X	X	X	.	X	X	X	.	.	.	.
IS_K1_K03	.	X	X	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_K04	.	.	.	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	X	.
IS_K1_K05	.	X	X	X	.	X	X	.	X	X	.	X	.	X	X	.	X	X	X	X	X	.	.
IS_K1_K06	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.

symbol	Elective module - III: Social responsibility for environmental protection	Electrical engineering	Elements of informatics and foundations of programming	Energetic efficiency of industrial processes	Energetic efficiency of municipal facilities	Energy management in industry	Energy production techniques	Engineering drawing with CAD I	Engineering drawing with CAD II	Engineering drawing with CAD III	Engineering drawing with CAD IV	Engineering drawing with CAD V	Environmental biology and basics of ecology	Environmental hazards in industrial processes	Environmental metrology	Environmental monitoring	Environmental protection	Ergonomics and industrial safety and hygiene	Excavation works	Final seminary - the environmental area	Final seminary - the industrial area	Fluid mechanics	Foreign language
IS_K1_W01	.	.	.	.	X	.	.	.	.	.	.	.	X	.	X	.	.	.	.	X	.	X	.
IS_K1_W02	.	.	X	.	.	.	.	X	.	X	X	X	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W03	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	X	.	.	.	.	.
IS_K1_W04	.	.	.	.	.	.	.	.	X	.	.	.	.	.	X	.	.	.	.	.	.	.	.
IS_K1_W05	.	X	.	X	.	X	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.
IS_K1_W06	X	.	.	.	.	.	.	.	.	.	.	.	X	X	.	X	X	.	.	.	.	.	.
IS_K1_W07	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
IS_K1_W08	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.
IS_K1_W10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.
IS_K1_W11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W12	.	.	.	X	.	X	X	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.
IS_K1_W13	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W14	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
IS_K1_W15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X
IS_K1_U01	.	.	.	.	.	.	.	.	.	.	.	.	X	.	X	X	.	.	X	X	.	.	.
IS_K1_U02	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U03	.	.	X	.	.	.	.	X	X	X	X	X	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X
IS_K1_U05	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X
IS_K1_U06	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
IS_K1_U07	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.	.	.	.
IS_K1_U08	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	X	.
IS_K1_U09	.	.	.	X	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U10	.	.	.	X	.	X	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.
IS_K1_U11	.	X	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U12	.	X	.	.	X	.	.	.	X	.	.	.	X	X	.	X	.	.	.	.	X	.	.
IS_K1_K01	.	.	X	X	.	.	X	X	X	.	X	X	X	.	.	.	.	X	X	X	.	X	X
IS_K1_K02	.	X	.	.	.	X	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.
IS_K1_K03	.	.	.	.	X	X	X	.	X	.	.	.	.	X	.	.	.	.	.	.	.	.	.
IS_K1_K04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_K05	.	.	.	X	X	X	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.	.
IS_K1_K06	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.

symbol	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Foreign language	Gas system design	General chemistry	General Mathematics	General Physics	Geodesy with geographic information elements	Geotechnics and soil mechanics	Heating, ventilation and air - conditioning	Hydrology, meteorology and climatology	Impact assessment of the enterprises on the environment	Industrial pollutions	Industry water management	Information technology	Materials science	Mathematics for engineers	Mechanical operations in industrial installations	Mechanical operations in sanitary installations
IS_K1_W01	.	.	.	.	.	.	.	.	X	X	X	.	.	.	X	.	.	.	.	.	X	.	.
IS_K1_W02	.	.	.	.	.	.	.	X	.	.	.	X	X	X	.	.	.	.	X	.	.	X	X
IS_K1_W03	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	X	.	.	.	.	.	.
IS_K1_W04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W05	.	.	.	X	X	X	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.
IS_K1_W06	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	X	.	.	.	.	.	.
IS_K1_W07	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.
IS_K1_W08	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W09	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	X	X
IS_K1_W10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W11	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.
IS_K1_W12	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	X	.	.	.	.	.
IS_K1_W13	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	X	.	X	.	.	.	.	.
IS_K1_W14	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W15	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.
IS_K1_W16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W17	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
IS_K1_U01	.	.	.	.	.	.	.	.	X	.	.	X	.	X	X	X	.	X	X	.	.	.	.
IS_K1_U02	.	.	.	X	X	X	X	.	.	.	.	X	.	.	.	.	.	.	X	.	.	.	.
IS_K1_U03	.	.	.	X	X	X	X	.	.	.	.	X	.	X	.	.	.	.	X	.	.	.	.
IS_K1_U04	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.
IS_K1_U05	X	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U06	.	.	.	.	.	.	.	.	.	X	.	.	.	.	X	.	.	.	.	.	X	.	.
IS_K1_U07	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U08	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	X	X	.	.	.	.	.
IS_K1_U10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.
IS_K1_U11	.	.	.	.	.	.	.	X	X	.	.	.	X	X	.	.	.	.	.	.	.	X	X
IS_K1_U12	.	.	.	.	.	.	.	X	.	.	.	.	X	X	.	.	X	.	.	.	.	X	X
IS_K1_K01	X	X	X	X	X	X	X	X	X	X	X	.	X	.	.	.	.	.	X	X	X	X	X
IS_K1_K02	.	.	.	.	.	.	.	X	.	.	.	.	X	X	X	X	X	X	.	.	.	.	.
IS_K1_K03	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	X	X
IS_K1_K04	.	.	.	X	X	X	X	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.
IS_K1_K05	.	.	.	.	.	.	.	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	.
IS_K1_K06	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.

symbol	Mechanics	Methods of the impact of industry on the environment	Municipal energy management	Municipal recycling	Physical education	Physical education	Physics for engineers	Professional practice	Protection of intelectual property	Sanitary Chemistry	Strength of materials	Technical metrology	Technical thermodynamics	Technologies and industrial apparatus	Thermal and diffusion processes in industrial installations	Thermal and diffusion processes in sanitary installations	Underground infrastructure	Vehicle recycling	Waste management	Wastewater technology	Water management and water protection	Water system design	Water Technology
IS_K1_W01	.	.	.	.	.	.	X	.	.	.	.	.	X	.	X	X	.	.	.	.	.	.	.
IS_K1_W02	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W03	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
IS_K1_W04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	X	.
IS_K1_W05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W06	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	X	X	X	.	.	.
IS_K1_W07	X	.	.	X	.	.	.	.	.	.	X	.	.	X	X	X	.	.	.	.	.	.	.
IS_K1_W08	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W09	.	.	.	.	.	.	.	X	.	X	.	X	.	.	.	.	.	.	.	.	.	.	X
IS_K1_W10	.	.	X	.	.	.	.	X	.	.	.	.	.	.	.	.	X	.	.	.	.	X	.
IS_K1_W11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W12	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.
IS_K1_W13	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W14	.	X	X	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	X	.	.	.	.
IS_K1_W15	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W16	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_W17	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U01	.	.	.	X	.	.	X	.	.	.	X	.	X	.	.	.	X	.	X	X	X	X	.
IS_K1_U02	.	X	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.
IS_K1_U03	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	X	.
IS_K1_U04	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U06	.	.	.	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.	X	.	.	.
IS_K1_U07	.	.	X	X	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
IS_K1_U08	.	.	.	.	.	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.	.	.	X
IS_K1_U09	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.
IS_K1_U10	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	X	.	X	.	.
IS_K1_U11	X	.	X	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.
IS_K1_U12	.	.	.	.	.	.	.	.	.	X	.	.	.	.	X	X	.	.	.	.	.	.	.
IS_K1_K01	.	.	.	.	.	.	X	.	.	.	X	X	.	X	X	X	X	.	.	X	.	X	.
IS_K1_K02	.	X	X	.	.	.	.	X	.	X	.	.	.	.	.	.	.	.	X	.	X	.	.
IS_K1_K03	X	.	.	X	.	.	.	X	.	.	.	.	.	.	.	.	.	.	X	.	X	.	.
IS_K1_K04	.	.	.	.	.	.	.	X	.	.	X	.	.	X	.	.	.	.	.	.	.	X	.
IS_K1_K05	.	X	X	.	.	.	X	.	.	.	.	.	.	.	X	X	.	X	.	.	.	.	X
IS_K1_K06	.	.	.	.	.	.	.	X	X	.	.	.	X	.	.	.	.	.	.	X	.	.	.

Wiedza - efekty nie pokryte:
Brak

Umiejętności - efekty nie pokryte:
Brak

Kompetencje - efekty nie pokryte:
Brak