Załącznik nr 2 do uchwały nr 412 Senatu Politechniki Opolskiej z dnia 29.05.2024 r.

Załącznik nr 11 do Księgi Jakości Kształcenia

KARTA PROGRAMU STUDIÓW

Nazwa programu studiów **Mechanical Engineering**

Specjalności: Computer Aided Engineering - CAE

Nazwa wydziału **Wydział Mechaniczny**

poziom studiów (I stopnia / II stopnia / jednolite studia magisterskie)	Studia drugiego 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 412 Senatu Politechniki Opolskiej
data i numer uchwały Senatu ustalającej kierunkowe efekty uczenia się	29.05.2024 Uchwała nr 412 Senatu Politechniki Opolskiej
dyscyplina wiodąca (w ramach której będzie uzyskiwana ponad połowa efektów uczenia się) – podać udział procentowy	Inżynieria Mechaniczna - 100%
pozostałe dyscypliny – podać udział procentowy	
czas trwania studiów (w semestrach)	3 sem.
łączna liczba punktów ECTS (w tym praktyki)	CAE - 90 Razem - 90
łączna liczba godzin w planie studiów (w tym praktyki)	CAE - 975 Razem - 975
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)	Zasady i formę odbywania praktyk określono w karcie opisu przedmiotu oraz w Regulaminie praktyk studenckich w Politechnice Opolskiej.

tytuł zawodowy otrzymywany przez absolwenta	Magister inżynier
klasyfikacja ISCED	0715
związek z misją i strategią rozwoju Politechniki Opolskiej	Kształcenie na danym kierunku 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)	Ukończone studia I-go stopnia z tytułem inżyniera po danym lub pokrewnym kierunku. Preferowani są kandydaci o zainteresowaniach technicznych, umiejętnościach analitycznych oraz wiedzy z zakresu przedmiotów kierunkowych. Kandydat powinien również posiadać umiejętność rozwiązywania problemów i być zorientowany na pracę w grupie. Poziom 6 PRK.
zasady rekrutacji (w tym: przedmioty kwalifikacyjne oraz ustalone dla nich współczynniki wagowe)	Kandydat powinien posiadać tytuł zawodowy inżyniera lub równorzędny, uzyskany na tym samym lub pokrewnym kierunku studiów. Wykaz kierunków pokrewnych określa rada wydziału. Kryterium decydującym o przyjęciu na studia drugiego stopnia jest wartość wskaźnika rankingowego równa ocenie z dyplomu ukończenia poprzednich studiów, na tym samym lub pokrewnym kierunku. W przypadku braku dyplomu ukończenia studiów, kandydat może dostarczyć zaświadczenie o zdanym egzaminie dyplomowym. Oryginał lub odpis dyplomu (wydany przez uczelnię) wraz z suplementem musi być dostarczony w tym przypadku, w terminie określonym przez Komisję Rekrutacyjną.
sposoby weryfikacji zakładanych efektów uczenia się	Wykaz egzaminów oraz zasady oceniania poszczególnych przedmiotów są zawarte w kartach opisu przedmiotów.

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. CAE / 49
	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	CAE - 5
	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	CAE - 46
	liczba punktów ECTS, którą student musi uzyskać w ramach zajęć z dziedziny nauk humanistycznych lub nauk społecznych	CAE - 5
	w przypadku studiów stacjonarnych I stopnia lub jednolitych magisterskich liczba godzin zajęć z wychowania fizycznego	nie dotyczy
	liczba punktów ECTS objętych programem studiów uzyskiwana w ramach zajęć do wyboru	CAE - 65

Program studiów zaopiniowany przez organ samorządu studenckiego.

Sylwetka absolwenta

Mechanical Engineering, Studia drugiego stopnia, Studia stacjonarne,
Computer Aided Engineering

Wiedza:

Absolwent ma pogłębioną wiedzę z matematyki umożliwiającą rozwiązywanie problemów w zakresie projektowania, wytwarzania i eksploatacji maszyn. Ma ugruntowaną wiedzę w zakresie mechaniki analitycznej i drgań. Ma pogłębioną, podbudowaną teoretycznie wiedzę o materiałach inżynierskich stosowanych w budowie maszyn, badaniu ich właściwości, doborze i trendach rozwojowych w tym zakresie. Ma pogłębioną wiedzę w zakresie modelowania i konstruowania maszyn z wykorzystaniem technik komputerowych. Absolwent ma pogłębioną wiedzę w zakresie technik wytwarzania. Ma ugruntowaną i pogłębioną wiedzę związaną z wybranymi zagadnieniami z zakresu funkcjonowania, budowy, obsługi, diagnozowania stanu technicznego, technologii napraw i bezpiecznego użytkowania maszyn i urządzeń. Ma pogłębioną wiedzę o cyklu życia urządzeń mechanicznych. Ma pogłębioną wiedzę niezbędną do rozumienia społecznych, ekonomicznych, prawnych, ekologicznych i innych pozatechnicznych uwarunkowań działalności inżynierskiej. Absolwent ma ugruntowaną wiedzę dotyczącą zarządzania w tym zarządzania jakością, logistyki i prowadzenia działalności gospodarczej. Ma ugruntowaną wiedzę w zakresie ochrony własności intelektualnej. Zna i rozumie w pogłębionym stopniu teorie i terminologię z zakresu języka obcego właściwą dla studiowanego kierunku, umożliwiającą posługiwanie się językiem obcym na poziomie B2+ Europejskiego Systemu Opisu Kształcenia Językowego.

Umiejętności:

Absolwent sprawnie pozyskuje informacje z literatury, baz danych i innych źródeł, potrafi integrować uzyskane informacje, dokonywać ich interpretacji, a także wyciągać wnioski oraz formułować i uzasadniać opinie. Sprawnie porozumiewa się przy użyciu różnych technik w środowisku zawodowym oraz w innych środowiskach. Sprawnie posługuje się technikami informacyjno-komunikacyjnymi właściwymi do wykonywania zadań inżynierskich. Absolwent wykorzystuje do formułowania i rozwiązywania zadań inżynierskich, metody analityczne, symulacyjne oraz eksperymentalne. Ma dobre przygotowanie do pracy w środowisku przemysłowym oraz doskonale zna zasady bezpieczeństwa związane z tą pracą. Posiada doświadczenie w wykonywaniu analiz ekonomicznych podejmowanych działań inżynierskich. Absolwent krytycznie analizuje i ocenia sposoby funkcjonowania rozwiązań technicznych: urządzeń, obiektów, systemów, procesów i usług. Identyfikuje i opisuje problemy inżynierskie oraz potrafi je rozwiązywać i ulepszać. Ocenia przydatność i prawidłowo wybiera metody i narzędzia najlepiej nadające się do rozwiązywania zadań inżynierskich. Absolwent projektuje i usprawnia procesy, obiekty lub systemy niezbędne dla wykonywania zadań inżynierskich z uwzględnieniem aspektów pozatechnicznych. Potrafi formułować i testować hipotezy związane z problemami inżynierskimi i prostymi problemami badawczymi w budowie i eksploatacji maszyn. Potrafi ocenić przydatność i możliwość wykorzystania różnych technik i technologii w zakresie projektowania i wytwarzania maszyn i urządzeń. Absolwent ma umiejętność samokształcenia się. Potrafi posługiwać się językiem obcym na poziomie B2+

Europejskiego Systemu Opisu Kształcenia Językowego oraz w wyższym stopniu w zakresie specjalistycznej terminologii. Potrafi kierować grupą, inspirować jej działania oraz współpracować z innymi podmiotami.

Kompetencje społeczne:

Absolwent ma świadomość potrzeby uzupełniania wiedzy specjalistycznej przez całe życie i potrafi dobrać właściwe źródła wiedzy i metody uczenia dla siebie i innych. Rozumie pozatechniczne aspekty działalności inżyniera mechanika i menedżera, między innymi jej konsekwencje społeczne oraz wpływ na stan środowiska. Ma świadomość odpowiedzialności związanej z decyzjami, podejmowanymi w ramach działalności inżynierskiej i menedżerskiej, szczególnie w kategoriach bezpieczeństwa własnego i innych osób oraz ochrony środowiska. Absolwent ma świadomość ważności postępowania profesjonalnego, przestrzegania zasad etyki zawodowej oraz poszanowania różnorodności poglądów. Potrafi wykazywać się przedsiębiorczością i pomysłowością w działaniu związanym z realizacją zadań zawodowych. Rozumie społeczną rolę inżyniera oraz bierze udział w przekazywaniu społeczeństwu wiarygodnych informacji i opinii dotyczących rozwoju techniki i związanych z tym zagrożeń.

Knowledge:

The graduate has in-depth knowledge of mathematics that enables solving problems in the design, manufacture and operation of machines. S/he has solid knowledge of analytical mechanics and vibration. The graduate has in-depth, theoretically underpinned knowledge of the engineering materials used in the construction of machines, testing of their properties, selection and development trends in this field. S/he sas in-depth knowledge in the modelling and construction of machines using computer techniques. The graduate has in-depth knowledge of manufacturing techniques, has solid, in-depth knowledge of selected issues in the functioning, construction, maintenance, technical diagnostics, repair technology and safe use of machines and devices. S/he has in-depth knowledge of the life cycle of mechanical devices. S/he has in-depth knowledge necessary to understand the social, economic, legal, ecological andother non-technical aspects of engineering activity. The graduate has solid knowledge of management, including quality management, logistics and business operations. S/he has solid knowledge of intellectual property protection The graduateknows and has deep understanding of the foreign language theory and terminology appropriate for their studies, which makes it possible to use the foreign language at the B2+ level of the Common European Framework of Reference for Languages.

Skills:

The graduate skilfully obtains information from literature, databases and other sources and integrates the obtained information, interprets it, draws conclusions and formulates and justifies opinions. S/he skilfully communicates using different techniques in professional and other environments. S/he skilfully uses information and communication techniques appropriate for the performance of engineering tasks. The graduate uses analytical, simulation and experimental methods to formulate and solve engineering tasks. S/he is well prepared for work in an industrial environment and has excellent knowledge of the safety rules associated with this work. S/he has experience in performing economic analyses for

undertaken engineering activities. The graduate critically analyses and evaluates the methods of operation of technical solutions, such as devices, facilities, systems, processes and services as well asidentifies and describes engineering issues and is able to solve and improve them. S/he evaluates suitability and appropriately chooses methods and tools that are best-suited to solve engineering tasks. The graduate designs and streamlines the processes, facilities or systems necessary to perform engineering tasks, taking into account non-technical aspects. S/he is able to formulate and test hypotheses related to engineering problems and simple research problems in machine construction and operation. S/he is able to assess the suitability and possibility of using various techniques and technologies in the design and manufacture of machines and devices. The graduate has self-study skills. The graduate is able to use a foreign language at the B2+ level of the Common European Framework of Reference for Languages and at a higher level within the specialist terminology. The graduate is able to lead a group, inspire it and work with other actors.

Social competences:

The graduate is aware of the need to improve their specialist knowledge throughout life and is able to select the appropriate knowledge sources and learning methods for themselves and others. S/he understands the non-technical aspects of the engineer and manager’s activity, including its social consequences and impact on the environment. S/he is aware of the responsibility for decisions made as part of the engineering and managerial activity, especially in terms of their own and other peoples’ safety and environmental protection. The graduate is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views. S/he is able to demonstrate entrepreneurship and ingenuity in the activity related to the implementation of professional tasks. S/he understands the social role of an engineer and participates in the provision of reliable information and opinions on the development of technology and related hazards.

Tabela kierunkowych efektów uczenia się

program studiów (kierunek studiów): **Mechanical Engineering** poziom studiów: **Studia drugiego stopnia** profil studiów: **Ogólnoakademicki**	
symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)
Wiedza: zna i rozumie	
ME_K2_W01	A student has in-depth knowledge of mathematics that enables solving problems in the design, manufacture and operation of machines
ME_K2_W02	A student has solid knowledge of analytical mechanics and vibration
ME_K2_W03	A student has in-depth, theoretically underpinned knowledge of the engineering materials used in the construction of machines, testing of their properties, selection and development trends in this field
ME_K2_W04	A student has in-depth knowledge in the modelling and construction of machines using computer techniques
ME_K2_W05	A student has in-depth knowledge of manufacturing techniques
ME_K2_W06	A student has solid, in-depth knowledge of selected issues in the functioning, construction, maintenance, technical diagnostics, repair technology and safe use of machines and devices
ME_K2_W07	A student has in-depth knowledge of the life cycle of mechanical devices
ME_K2_W08	A student has in-depth knowledge necessary to understand the social, economic, legal, ecological and other non-technical aspects of engineering activity
ME_K2_W09	A student has solid knowledge of management, including quality management, logistics and business operations
ME_K2_W10	A student has solid knowledge of intellectual property protection
ME_K2_W11	A student Knows and has deep understanding of the foreign language theory and terminology appropriate for their studies, which makes it possible to use the foreign language at the B2+ level of the Common European Framework of Reference for Languages
Umiejętności: potrafi	
ME_K2_U01	A student Skilfully obtains information from literature, databases and other sources and integrates the obtained information, interprets it, draws conclusions and formulates and justifies opinions
ME_K2_U02	A student Skilfully communicates using different techniques in professional and other environments
ME_k2_U03	A student skilfully uses information and communication techniques appropriate for the performance of engineering tasks

ME_K2_U04	A student use analytical, simulation and experimental methods to formulate and solve engineering tasks
ME_K2_U05	A student is well prepared for work in an industrial environment and has excellent knowledge of the safety rules associated with this work
ME_K2_U06	A student has experience in performing economic analyses for undertaken engineering activities
ME_K2_U07	A student critically analyses and evaluates the methods of operation of technical solutions, such as devices, facilities, systems, processes and services
ME_K2_U08	A student identifies and describes engineering issues and is able to solve and improve them
ME_K2_U09	A student evaluates suitability and appropriately chooses methods and tools that are best-suited to solve engineering tasks
ME_K2_U10	A student designs and streamlines the processes, facilities or systems necessary to perform engineering tasks, taking into account non-technical aspects
ME_K2_U11	A student is able to formulate and test hypotheses related to engineering problems and simple research problems in machine construction and operation
ME_K2_U12	A student is able to assess the suitability and possibility of using various techniques and technologies in the design and manufacture of machines and devices
ME_K2_U13	A student has self-study skills
ME_K2_U14	A student is able to use a foreign language at the B2+ level of the Common European Framework of Reference for Languages and at a higher level within the specialist terminology.
ME_K2_U15	A student is able to lead a group, inspire it and work with other actors
Kompetencje społeczne: jest gotów do	
ME_K2_K01	A student is aware of the need to improve their specialist knowledge throughout life and is able to select the appropriate knowledge sources and learning methods for themselves and others
ME_K2_K02	A student understands the non-technical aspects of the engineer and manager’s activity, including its social consequences and impact on the environment
ME_K2_K03	A student is aware of the responsibility for decisions made as part of the engineering and managerial activity, especially in terms of their own and other peoples’ safety and environmental protection
ME_K2_K04	A student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views
ME_K2_K05	A student is able to demonstrate entrepreneurship and ingenuity in the activity related to the implementation of professional tasks

ME_K2_K06	A student understands the social role of an engineer and participates in the provision of reliable information and opinions on the development of technology and related hazards

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): **Mechanical Engineering** poziom studiów: **Studia drugiego stopnia** profil studiów: **Ogólnoakademicki**		
symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)	kod składnika opisu
Wiedza: zna i rozumie		
ME_K2_W01	A student has in-depth knowledge of mathematics that enables solving problems in the design, manufacture and operation of machines	P7S_WG1
ME_K2_W02	A student has solid knowledge of analytical mechanics and vibration	P7S_WG1
ME_K2_W03	A student has in-depth, theoretically underpinned knowledge of the engineering materials used in the construction of machines, testing of their properties, selection and development trends in this field	P7S_WG1
ME_K2_W04	A student has in-depth knowledge in the modelling and construction of machines using computer techniques	P7S_WG1
ME_K2_W05	A student has in-depth knowledge of manufacturing techniques	P7S_WG1
ME_K2_W06	A student has solid, in-depth knowledge of selected issues in the functioning, construction, maintenance, technical diagnostics, repair technology and safe use of machines and devices	P7S_WG1 P7S_WG2
ME_K2_W07	A student has in-depth knowledge of the life cycle of mechanical devices	P7S_WG1
ME_K2_W08	A student has in-depth knowledge necessary to understand the social, economic, legal, ecological and other non-technical aspects of engineering activity	P7S_WK1 P7S_WK2 P7S_WK3
ME_K2_W09	A student has solid knowledge of management, including quality management, logistics and business operations	P7S_WK2 P7S_WK3
ME_K2_W10	A student has solid knowledge of intellectual property protection	P7S_WK2
ME_K2_W11	A student Knows and has deep understanding of the foreign language theory and terminology appropriate for their studies, which makes it possible to use the foreign language at the B2+ level of the Common European Framework of Reference for Languages	P7S_WG1
Umiejętności: potrafi		
ME_K2_U01	A student Skilfully obtains information from literature, databases and other sources and integrates the obtained information, interprets it, draws conclusions and formulates and justifies opinions	P7S_UW1

ME_K2_U02	A student Skilfully communicates using different techniques in professional and other environments	P7S_UK1 P7S_UK2 P7S_UO2 P7S_UW1
ME_k2_U03	A student skilfully uses information and communication techniques appropriate for the performance of engineering tasks	P7S_UK1 P7S_UW1
ME_K2_U04	A student use analytical, simulation and experimental methods to formulate and solve engineering tasks	P7S_UW1 P7S_UW2
ME_K2_U05	A student is well prepared for work in an industrial environment and has excellent knowledge of the safety rules associated with this work	P7S_UK1 P7S_UO2
ME_K2_U06	A student has experience in performing economic analyses for undertaken engineering activities	P7S_UW1
ME_K2_U07	A student critically analyses and evaluates the methods of operation of technical solutions, such as devices, facilities, systems, processes and services	P7S_UW1
ME_K2_U08	A student identifies and describes engineering issues and is able to solve and improve them	P7S_UW1
ME_K2_U09	A student evaluates suitability and appropriately chooses methods and tools that are best-suited to solve engineering tasks	P7S_UW1
ME_K2_U10	A student designs and streamlines the processes, facilities or systems necessary to perform engineering tasks, taking into account non-technical aspects	P7S_UW1
ME_K2_U11	A student is able to formulate and test hypotheses related to engineering problems and simple research problems in machine construction and operation	P7S_UW2
ME_K2_U12	A student is able to assess the suitability and possibility of using various techniques and technologies in the design and manufacture of machines and devices	P7S_UW1
ME_K2_U13	A student has self-study skills	P7S_UU
ME_K2_U14	A student is able to use a foreign language at the B2+ level of the Common European Framework of Reference for Languages and at a higher level within the specialist terminology.	P7S_UK3
ME_K2_U15	A student is able to lead a group, inspire it and work with other actors	P7S_UO1 P7S_UO2
Kompetencje społeczne: jest gotów do		
ME_K2_K01	A student is aware of the need to improve their specialist knowledge throughout life and is able to select the appropriate knowledge sources and learning methods for themselves and others	P7S_KK1 P7S_KK2
ME_K2_K02	A student understands the non-technical aspects of the engineer and manager’s activity, including its social consequences and impact on the environment	P7S_KK2 P7S_WK1
ME_K2_K03	A student is aware of the responsibility for decisions made as part of the engineering and managerial activity, especially in terms of their own and other peoples’ safety and environmental protection	P7S_KO1

ME_K2_K04	A student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views	P7S_KR
ME_K2_K05	A student is able to demonstrate entrepreneurship and ingenuity in the activity related to the implementation of professional tasks	P7S_KO3
ME_K2_K06	A student understands the social role of an engineer and participates in the provision of reliable information and opinions on the development of technology and related hazards	P7S_KO2

Uniwersalne charakterystyki poziomu 7 Polskiej Ramy Kwalifikacji zostały uwzględnione

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

program studiów (kierunek studiów): **Mechanical Engineering** poziom studiów: **Studia drugiego stopnia** profil studiów: **Ogólnoakademicki**		
kod składnika opisu	charakterystyki drugiego stopnia Polskiej Ramy Kwalifikacji	symbol kierunkowych efektów uczenia się
Wiedza: zna i rozumie		
P7S_WG1	Zna i rozumie w pogłębionym stopniu – wybrane fakty, obiekty i zjawiska oraz dotyczące ich metody i teorie wyjaśniające złożone zależności między nimi, stanowiące zaawansowaną wiedzę ogólną z zakresu dyscyplin naukowych lub artystycznych tworzących podstawy teoretyczne, uporządkowaną i podbudowaną teoretycznie wiedzę obejmującą kluczowe zagadnienia oraz wybrane zagadnienia z zakresu zaawansowanej wiedzy szczegółowej – właściwe dla programu studiów.	ME_K2_W01 ME_K2_W02 ME_K2_W03 ME_K2_W04 ME_K2_W05 ME_K2_W06 ME_K2_W07 ME_K2_W11
P7S_WG2	Zna i rozumie główne tendencje rozwojowe dyscyplin naukowych lub artystycznych, do których jest przyporządkowany kierunek studiów.	ME_K2_W06
P7S_WK1	Zna i rozumie fundamentalne dylematy współczesnej cywilizacji.	ME_K2_W08
P7S_WK2	Zna i rozumie ekonomiczne, prawne, etyczne i inne uwarunkowania różnych rodzajów działalności zawodowej związanej z kierunkiem studiów, w tym zasady ochrony własności przemysłowej i prawa autorskiego.	ME_K2_W08 ME_K2_W09 ME_K2_W10
P7S_WK3	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form przedsiębiorczości.	ME_K2_W08 ME_K2_W09
Umiejętności: potrafi		
P7S_UK1	Potrafi komunikować się na tematy specjalistyczne ze zróżnicowanymi kręgami odbiorców.	ME_K2_U02 ME_k2_U03 ME_K2_U05
P7S_UK2	Potrafi prowadzić debatę.	ME_K2_U02
P7S_UK3	Potrafi posługiwać się językiem obcym na poziomie B2+ Europejskiego Systemu Opisu Kształcenia Językowego oraz specjalistyczną terminologią.	ME_K2_U14
P7S_UO1	Potrafi kierować pracą zespołu.	ME_K2_U15
P7S_UO2	Potrafi współdziałać z innymi osobami w ramach prac zespołowych i podejmować wiodącą rolę w zespołach.	ME_K2_U02 ME_K2_U05 ME_K2_U15
P7S_UU	Potrafi samodzielnie planować i realizować własne uczenie się przez całe życie i ukierunkowywać innych w tym zakresie.	ME_K2_U13

P7S_UW1	Potrafi wykorzystywać posiadaną wiedzę – formułować i rozwiązywać złożone i nietypowe problemy oraz innowacyjnie wykonywać zadania w nieprzewidywalnych warunkach przez: - właściwy dobór źródeł i informacji z nich pochodzących, dokonywanie oceny, krytycznej analizy, syntezy, twórczej interpretacji i prezentacji tych informacji, - dobór oraz stosowanie właściwych metod i narzędzi, w tym zaawansowanych technik informacyjno-komunikacyjnych, - przystosowanie istniejących lub opracowanie nowych metod i narzędzi.	ME_K2_U01 ME_K2_U02 ME_k2_U03 ME_K2_U04 ME_K2_U06 ME_K2_U07 ME_K2_U08 ME_K2_U09 ME_K2_U10 ME_K2_U12
P7S_UW2	Potrafi formułować i testować hipotezy związane z prostymi problemami badawczymi.	ME_K2_U04 ME_K2_U11
Kompetencje społeczne: jest gotów do		
P7S_KK1	Jest gotów do krytycznej oceny posiadanej wiedzy i odbieranych treści.	ME_K2_K01
P7S_KK2	Jest gotów do uznawania znaczenia wiedzy w rozwiązywaniu problemów poznawczych i praktycznych oraz zasięgania opinii ekspertów w przypadku trudności z samodzielnym rozwiązaniem problemu.	ME_K2_K01 ME_K2_K02
P7S_KO1	Jest gotów do wypełniania zobowiązań społecznych, współorganizowania działalności na rzecz środowiska społecznego.	ME_K2_K03
P7S_KO2	Jest gotów do inicjowania działań na rzecz interesu publicznego.	ME_K2_K06
P7S_KO3	Jest gotów do myślenia i działania w sposób przedsiębiorczy.	ME_K2_K05
P7S_KR	Jest gotów do odpowiedzialnego pełnienia ról zawodowych, z uwzględnieniem zmieniających się potrzeb społecznych, w tym: - rozwijania dorobku zawodu, - podtrzymywania etosu zawodu, - przestrzegania i rozwijania zasad etyki zawodowej oraz działania na rzecz przestrzegania tych zasad.	ME_K2_K04

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

program studiów (kierunek studiów): **Mechanical Engineering** poziom studiów: **Studia drugiego stopnia** profil studiów: **Ogólnoakademicki**		
symbol kierunkowych efektów uczenia się	efekty uczenia się (treść)	kod składnika opisu
Wiedza: zna i rozumie		
ME_K2_W01	A student has in-depth knowledge of mathematics that enables solving problems in the design, manufacture and operation of machines	
ME_K2_W02	A student has solid knowledge of analytical mechanics and vibration	
ME_K2_W03	A student has in-depth, theoretically underpinned knowledge of the engineering materials used in the construction of machines, testing of their properties, selection and development trends in this field	
ME_K2_W04	A student has in-depth knowledge in the modelling and construction of machines using computer techniques	
ME_K2_W05	A student has in-depth knowledge of manufacturing techniques	
ME_K2_W06	A student has solid, in-depth knowledge of selected issues in the functioning, construction, maintenance, technical diagnostics, repair technology and safe use of machines and devices	
ME_K2_W07	A student has in-depth knowledge of the life cycle of mechanical devices	P7S_WG
ME_K2_W08	A student has in-depth knowledge necessary to understand the social, economic, legal, ecological and other non-technical aspects of engineering activity	
ME_K2_W09	A student has solid knowledge of management, including quality management, logistics and business operations	P7S_WK
ME_K2_W10	A student has solid knowledge of intellectual property protection	
ME_K2_W11	A student Knows and has deep understanding of the foreign language theory and terminology appropriate for their studies, which makes it possible to use the foreign language at the B2+ level of the Common European Framework of Reference for Languages	
Umiejętności: potrafi		
ME_K2_U01	A student Skilfully obtains information from literature, databases and other sources and integrates the obtained information, interprets it, draws conclusions and formulates and justifies opinions	
ME_K2_U02	A student Skilfully communicates using different techniques in professional and other environments	

ME_k2_U03	A student skilfully uses information and communication techniques appropriate for the performance of engineering tasks	
ME_K2_U04	A student use analytical, simulation and experimental methods to formulate and solve engineering tasks	P7S_UW1 P7S_UW2 P7S_UW3
ME_K2_U05	A student is well prepared for work in an industrial environment and has excellent knowledge of the safety rules associated with this work	P7S_UW1
ME_K2_U06	A student has experience in performing economic analyses for undertaken engineering activities	
ME_K2_U07	A student critically analyses and evaluates the methods of operation of technical solutions, such as devices, facilities, systems, processes and services	
ME_K2_U08	A student identifies and describes engineering issues and is able to solve and improve them	
ME_K2_U09	A student evaluates suitability and appropriately chooses methods and tools that are best-suited to solve engineering tasks	
ME_K2_U10	A student designs and streamlines the processes, facilities or systems necessary to perform engineering tasks, taking into account non-technical aspects	P7S_UW3 P7S_UW4
ME_K2_U11	A student is able to formulate and test hypotheses related to engineering problems and simple research problems in machine construction and operation	P7S_UW1
ME_K2_U12	A student is able to assess the suitability and possibility of using various techniques and technologies in the design and manufacture of machines and devices	P7S_UW3
ME_K2_U13	A student has self-study skills	
ME_K2_U14	A student is able to use a foreign language at the B2+ level of the Common European Framework of Reference for Languages and at a higher level within the specialist terminology.	
ME_K2_U15	A student is able to lead a group, inspire it and work with other actors	
Kompetencje społeczne: jest gotów do		
ME_K2_K01	A student is aware of the need to improve their specialist knowledge throughout life and is able to select the appropriate knowledge sources and learning methods for themselves and others	
ME_K2_K02	A student understands the non-technical aspects of the engineer and manager’s activity, including its social consequences and impact on the environment	
ME_K2_K03	A student is aware of the responsibility for decisions made as part of the engineering and managerial activity, especially in terms of their own and other peoples’ safety and environmental protection	
ME_K2_K04	A student is aware of the importance of professional conduct, adherence to professional ethics and respecting the diversity of views	

ME_K2_K05	A student is able to demonstrate entrepreneurship and ingenuity in the activity related to the implementation of professional tasks	
ME_K2_K06	A student understands the social role of an engineer and participates in the provision of reliable information and opinions on the development of technology and related hazards	

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

program studiów (kierunek studiów): **Mechanical Engineering** poziom studiów: **Studia drugiego stopnia** profil studiów: **Ogólnoakademicki**		
kod składnika opisu	charakterystyki drugiego stopnia Polskiej Ramy Kwalifikacji	symbol kierunkowych efektów uczenia się
Wiedza: zna i rozumie		
P7S_WG	Zna i rozumie podstawowe procesy zachodzące w cyklu życia urządzeń, obiektów i systemów technicznych.	ME_K2_W07
P7S_WK	Zna i rozumie podstawowe zasady tworzenia i rozwoju różnych form indywidualnej przedsiębiorczości.	ME_K2_W09
Umiejętności: potrafi		
P7S_UW1	Potrafi planować i przeprowadzać eksperymenty, w tym pomiary i symulacje komputerowe, interpretować uzyskane wyniki i wyciągać wnioski.	ME_K2_U04 ME_K2_U05 ME_K2_U11
P7S_UW2	Potrafi przy identyfikacji i formułowaniu specyfikacji zadań inżynierskich oraz ich rozwiązywaniu: - wykorzystywać metody analityczne, symulacyjne i eksperymentalne, - dostrzegać ich aspekty systemowe i pozatechniczne, wtym aspekty etyczne, - dokonywać wstępnej oceny ekonomicznej proponowanych rozwiązań podejmowanych działań inżynierskich.	ME_K2_U04
P7S_UW3	Potrafi dokonywać krytycznej analizy sposobu funkcjonowania istniejących rozwiązań technicznych i oceniać ich rozwiązania.	ME_K2_U04 ME_K2_U10 ME_K2_U12
P7S_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.	ME_K2_U10

Wydział Mechaniczny

POLITECHNIKA OPOLSKA

Plan studiów
Study plan

Kierunek studiów – Field of study

- MECHANICAL ENGINEERING

- MECHANIKA I BUDOWA MASZYN

Studia stacjonarne
drugiego stopnia
- wg specjalności

Second Cycle Programme – Full-Time Studies

CHARAKTERYSTYKA OGÓLNA

kierunek studiów: MECHANICAL ENGINEERING

specjalność: COMPUTER AIDED ENGINEERING

profil: OGÓLNOAKADEMICKI

nazwa wydziału: WYDZIAŁ MECHANICZNY

plan studiów	uchwała Senatu PO z dnia	nr 412 Senatu PO z dn.29.05.2024r.
	obowiązuje od roku akademickiego	**2024/2025**
forma studiów (stacjonarne / niestacjonarne)		**stacjonarne**
poziom studiów (I stopnia / II stopnia)		**II-go stopnia**
czas trwania (w sem.)		**3**
tytuł zawodowy otrzymywany przez absolwenta		**Magister inżynier**
liczba punktów ECTS		**90**

PLAN STUDIÓW – STUDY PLAN

POLITECHNIKA OPOLSKA **WYDZIAŁ MECHANICZNY**	**OPOLE UNIVERSITY OF TECHNOLOGY** **FACULTY OF MECHANICAL ENGINEERING**
Kierunek studiów:	**Field of study:**
MECHANICAL ENGINEERING	**MECHANIKA I BUDOWA MASZYN**
STUDIA STACJONARNE DRUGIEGO STOPNIA – MAGISTERSKIE	
SECOND CYCLE PROGRAMME - FULL-TIME STUDIES *(Master of Science degree)*	

Specjalność – Specialization:

COMPUTER AIDED ENGINEERING

- KOMPUTEROWE WSPOMAGANIE PRAC IN□YNIERSKICH

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	Computational Mechanics Mechanika obliczeniowa	15E	30	15	-	-	5	P
1.2	Digital Modelling of Machines Modelowanie cyfrowe maszyn	15	-	-	15	-	2	K
1.3	Material design Projektowanie materiałów	15	-	15	-	-	3	K
1.4	Manufacturing Process Modeling Modelowanie procesów wytwarzania	15	-	-	15	-	3	K
1.5	Advanced FEA Techniques Zaawansowane techniki MES	-	-	30	-	-	2	K
1.6	Hydraulic and pneumatic systems in manufacturing machines Układy hydrauliczne i pneumatyczne w maszynach wytwórczych	15	-	-	15	-	2	K
1.7	Repair technology Technologia napraw	15E	-	-	15	-	3	K
1.8	Research Methodology Metodologia prowadzenia badań	15	-	-	15	-	3	K
1.9	Design principles and technology of apparatus manufacture Zasady konstruowania i technologia wytwarzania aparatury	-	-	-	30	-	2	K
Przedmioty humanistyczne lub społeczne wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							5	
1.10	Humanistic and social subject I Przedmiot humanistyczno-społeczny I	30	-	-	-	-	(2)	W-HS
1.11	Humanistic and social subject II Przedmiot humanistyczno-społeczny II	30	-	-	-	-	(3)	W-HS
Liczba godzin w semestrze (Number of hours in a semester)		165	195				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)		
Przedmioty wybieralne – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							2	
2.1	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)							28	
2.2	Additive manufacturing techniques and composites in design Techniki przyrostowe i kompozyty w projektowaniu	15	-	15	15	-	(3)	W-K
2.3	Machine tool programming including CAM systems Programowanie obrabiarek wraz z systemami CAM	15E	15	15	-	-	(3)	W-K
2.4	Machine elements technology Technologia elementów maszyn	15	-	-	15	-	(2)	W-K
2.5	Electrical machine drives Napędy elektryczne maszyn	15	-	15	-	-	(2)	W-K
2.6	Design of mechanical connections in FEM Projektowanie połączeń mechanicznych w MES	15	-	-	30	-	(3)	W-K
2.7	Optimization in machine design Optymalizacja w projektowaniu maszyn	15	-	30	-	-	(3)	W-K
2.8	Unconventional drive systems in machines Niekonwencjonalne układy napędowe w maszynach	15	-	-	15	-	(3)	W-K
2.9	Modern forming technologies Nowoczesne technologie kształtowania	30E	-	30	-	-	(4)	W-K
2.10	Diploma thesis Praca dyplomowa	godziny niekontaktowe (un-contact hours)					(5)	W-K
Liczba godzin w semestrze (Number of hours in a semester)		135	225				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)		
Przedmioty wybieralne kierunkowe – wymagana liczba p. ECTS w semestrze (Optional units – compulsory ECTS in a semester)							30	
3.1	Diploma seminar Seminarium dyplomowe	-	-	-	-	30	(2)	W-K
3.2	Frequency characteristics of machine elements Charakterystyki częstotliwościowe elementów maszyn	15	-	15	-	-	(2)	W-K
3.3	Industrial standards in design Normy przemysłowe w projektowaniu	15E	-	30	-	-	(3)	W-K
3.4	Reverse engineering Inżynieria odwrotna	15	-	15	-	-	(2)	W-K
3.5	Coordinate Metrology in Quality Engineering Metrologia współrzędnościowa w inżynierii jakości	15	-	15	-	-	(2)	W-K
3.6	Control in vehicles and autonomous machines Sterowanie w pojazdach i maszynach autonomicznych	15	-	-	15	-	(2)	W-K
3.7	Diagnostic systems for machines Systemy diagnostyczne maszyn	15	-	15	-	-	(1)	W-K
3.8	Systems in operation and maintenance management Systemy w zarządzaniu eksploatacją i utrzymaniem ruchu	15	-	-	15	-	(1)	W-K
3.9	Diploma thesis Praca dyplomowa	E -godziny niekontaktowe (un-contact hours)					(15)	W-K
Liczba godzin w semestrze (Number of hours in a semester)		105	150				30	
Razem godzin/ECTS w semestrze (Total hours/ECTS in a semester)		255						

PLAN STUDIÓW RAZEM (TOTAL STUDY PLAN)		ECTS
Łącznie godzin kontaktowych/ECTS w planie studiów Total contact hours/ECTS in study plan	975	90

STATYSTYKA PROGRAMU STUDIÓW			
Typ	Przedmioty - p. ECTS razem	wg planu	udział
K	Kierunkowe	20	22.22 %
P	Podstawowe	5	5.56 %
W	Wybieralne	2	2.22 %
W-HS	Humanistyczne lub społeczne, wybieralne	5	5.56 %

W-K	Wybieralne kierunkowe	58	64.44 %
	Łącznie:	90	100.00 %

Program studiów dostosowany do kierunkowych efektów uczenia się dla kierunku studiów MECHANICAL ENGINEERING (studia drugiego 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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second

Course Title	Additive manufacturing techniques and composites in design
Nazwa przedmiotu	Techniki przyrostowe i kompozyty w projektowaniu

ECTS points	3	Subject type	W-K
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)	T

Preliminary requirements of the course	Knowledge	1	S/he has knowledge of CAD design has knowledge of CAD design
		2	S/he has knowledge of selected topics in machine design
	Skills	1	S/he is capable of using CAD software in the design process of complex components
		2	S/he is able to acquire knowledge from literature
	Social Competence	1	S/he is able to appropriately determine priorities for accomplishing a task defined by themselves or others
		2	

Course Goals The aim of the course is to provide students with a deep understanding of advanced additive techniques and the use of composite materials in the design process. The course aims to develop creative thinking and innovation in solving design problems, with an emphasis on the practical application of knowledge in real-world scenarios.

Programme content The course focuses on advanced additive techniques, including the use of composites in the design process. Students gain knowledge about various materials and 3D printing methods, including FDM, and their applications in creating complex designs. The course emphasizes the importance of innovation and creativity in solving design problems.

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	S/he has knowledge that allows for the use of mathematical methods to conduct engineering design calculations	ME_K2_W01	W L	C G P
	2	S/he has elementary knowledge in the field of numerical methods used in the engineering environment	ME_K2_W04	W L	C P
	3	S/he has knowledge in the field of additive manufacturing techniques	ME_K2_W05	W L	C
Skills	1	S/he hi capable of conducting critical analyses of problems occurring during the design process	ME_K2_U08	L	G P
	2	Self-education	ME_K2_U13	W	C
	3	A student can lead a group	ME_K2_U15	L P	P
Social Competence	1	S/he understands the risks associated with the design and manufacturing process	ME_K2_K03	W L	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)	15	dr inż. Kurek Andrzej
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	15
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	15
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First
Course Title	Advanced FEA Techniques
Nazwa przedmiotu	Zaawansowane techniki MES

ECTS points	2	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)	T

Preliminary requirements of the course	Knowledge	1	Has knowledge of machine design using computer technology.
		2	
	Skills	1	Proficient in the use of computer methods and programmes useful for the engineering activities undertaken.
		2	
	Social Competence	1	Is aware of the need to supplement expertise throughout life and is able to select appropriate sources of knowledge and methods of learning for themselves and others.
		2	

Course Goals Prepare students to perform advanced FEM simulations independently.

Programme content Finite element calculations of practical mechanical engineering problems and coupled analysis.

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	has an in-depth knowledge of the modelling of structures and their calculation by means of the finite element method and knows the limitations, verification methods and area of application of this method	ME_K2_W01	L	D G L P
	2				
Skills	1	is proficient in the use of methods and computer programs useful in carrying out the engineering activities undertaken	ME_K2_U02	L	D G L P
	2				
Social Competence	1	Able to comprehensively analyse and effectively carry out assigned tasks	ME_K2_K05	L	D G 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	prof. dr hab. inż. Niesłony Adam
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	0
Preparation of a report/paper/ project/presentation	0
Independent study of the course topics	30
Examination or final colloquium	0
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First
Course Title	Computational Mechanics
Nazwa przedmiotu	Mechanika obliczeniowa

ECTS points	5	Subject type	P

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

Preliminary requirements of the course	Knowledge	1	Has basic knowledge of point and solid kinematics
		2	Understands the concept of potential and kinetic energy
		3	Is able to solve first and second order differential equations analytical and numerical methods, also using methods computer algebra (e.g. symbolic calculations using freeware wx Maxima or other commonly used software available)
	Skills	1	Is able to formulate and solve problems in kinematics and dynamics a material point, a system of points and a rigid body
		2	Is able to use generally available calculation systems symbolic
	Social Competence	1	Is able to independently select and use sources of knowledge in the field of mechanics available in libraries and the Internet.
		2	Can think independently and critically

Course Goals Preparing students to analyze the dynamics of systems of material points and rigid bodies using methods of analytical mechanics

Programme content Methods of analytical mechanics in solving problems of the dynamics of a system of material points and a rigid body.

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	Is able to describe the motion of a mechanism with one and two degrees of freedom	ME_K2_W02	W C L	A F H P
	2	Able to model complex mechanical systems	ME_K2_W02	W C L	A F H P
Skills	1	Is able to describe and model the dynamics of complex mechanical systems	ME_K2_U09	W C L	A F H P
	2				
Social Competence	1	Is able to discuss the solution to a given problem	ME_K2_K06	W C L	A F H P
	2	Understands the need to constantly improve one's research skills and learn modern computational methods	ME_K2_K01	W C L	A F 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. Lachowicz Cyprian
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)	15
Calculation class (C)	30
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	28
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	25
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. Kluger Krzysztof
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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	Mechanical Engineering
Profile of Education	General Academic

Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third

Course Title	Control in vehicles and autonomous machines
Nazwa przedmiotu	Sterowanie w pojazdach i maszynach autonomicznych

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

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

Preliminary requirements of the course	Knowledge	1	S/he knows mathematical analysis covering topics related to differential and integral calculus
		2	
	Skills	1	S/he can use knowledge and analysis methods to solve tasks mathematics regarding differential and integral calculus
		2	
	Social Competence	1	S/he is aware of the need to supplement specialist knowledge throughout life and can select appropriate sources of knowledge and teaching methods for themselves and other
		2	S/he able to cooperate and act in a group, taking on various roles

Course Goals Preparing the student to design modern machines and their control systems using design-supporting software.

Programme content As part of the course, students learn the basics of how autonomous machines and vehicles function. They learn techniques for designing modern machines using design-aided software. The course will also discuss vision systems and other sensors used in autonomous machines.

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	S/he has detailed knowledge of the systems that make up an autonomous car	ME_K2_W03	W P	C L M
	2	S/he knows the applications of vision systems and machine learning methods in autonomous vehicles	ME_K2_W06	W P	C L M
Skills	1	S/he has the ability to analyze systems in autonomous vehicles	ME_K2_U07	P	C P R
	2	S/he can integrate data from sensors in vehicles.	ME_K2_U10	P	L M P R
Social Competence	1	S/he understands the need and knows the possibilities of continuous education	ME_K2_K01	W P	C L M P R
	2	S/he is ready to work in a team and understands responsibility for jointly performed tasks	ME_K2_K03	W P	C L 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. Graba Mariusz
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

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

Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Augustynowicz Andrzej
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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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third

Course Title	Coordinate Metrology in Quality Engineering
Nazwa przedmiotu	Metrologia współrzędnościowa w inżynierii jakości

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

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

Preliminary requirements of the course	Knowledge	1	S/he knows the basics of process design.
		2	S/he knows the basic methods of machine manufacturing technology.
	Skills	1	S/he can prepare a study of engineering tasks.
		2	S/he is able to obtain information from the literature, integrate the information obtained and draw conclusions.
		3	S/he knows how to analyze engineering tasks.
	Social Competence	1	S/he is aware of the need to supplement knowledge throughout life.
		2	S/he is aware of the responsibilities and consequences associated with his decisions.

Course Goals Prepare students to design technological processes for CNC machine tools including the selection of machine tools, tools and tooling.

Programme content Lecture on measurement systems in metrology of geometric quantities, quality control and control cards. Practical classes in the laboratory - coordinate measurement in product manufacturing and quality control.

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	He/She has knowledge of the manufacturing processes of machine and equipment components.	ME_K2_W01	W L	C H R
	2	He/She has knowledge of tooling and fixture selection and CNC machine tool programming.	ME_K2_W08	W L	C H R
Skills	1	He/She is able to develop a technological framework process of selected machine parts and complete technological documentation of machining for CNC machine tools.	ME_K2_U08	W L	C H I R
	2	He/She can obtain information from professional literature, databases and other sources.	ME_K2_U09	W L	C H I R
Social Competence	1	He/She is aware of the need to supplement knowledge throughout his life.	ME_K2_K01	W L	H I
	2	He/She is aware of the responsibility associated with decisions made in engineering activities, with particular emphasis on the consequences of these decisions.	ME_K2_K02	L	H I
	3	He/She is aware of the role of metrology in industry.	ME_K2_K04	W L	H I

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Bogdan-Chudy Marta
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	0
Independent study of the course topics	15
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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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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second
Course Title	Design of mechanical connections in FEM
Nazwa przedmiotu	Projektowanie połączeń mechanicznych w MES

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

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

Preliminary requirements of the course	Knowledge	1	Has knowledge about connections used in the construction and operation of machines.
		2	Has basic knowledge of numerical methods in mechanics.
	Skills	1	Is proficient in using CAE (Computer-Aided Engineering) software efficiently.
		2	
	Social Competence	1	Understands the need for lifelong learning.
		2	

Course Goals Introducing students to numerical analysis methods of typical connections used in the construction and operation of machines.

Programme content Characterization of various types of material models used in the Finite Element Method (FEM), contact phenomenon in the context of FEM, basics of analyzing detachable and non-detachable connections. Submodeling in numerical analysis of structural nodes.

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	Has in-depth knowledge in designing machine connections and nodes using computer-aided techniques.	ME_K2_W04	W P	C D K L M O R
	2				
Skills	1	Efficiently gathers information from literature, databases, and other sources, capable of integrating acquired information, interpreting it, drawing conclusions, and formulating and justifying opinions.	ME_K2_U01	W P	C D K L M O R
	2	Evaluates the usefulness and correctly selects methods and tools best suited for solving engineering tasks.	ME_K2_U09	W P	C D K L M O R
Social Competence	1	Is aware of the responsibility associated with decisions made within engineering and managerial activities, particularly in terms of personal safety, the safety of others, and environmental protection.	ME_K2_K03	W P	C D K L M O R
	2				

Methods of verification of learning outcomes:

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

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Kowalski Mateusz
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	0
Independent study of the course topics	15
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. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First
Course Title	Design principles and technology of apparatus manufacture

Nazwa przedmiotu	Zasady konstruowania i technologia wytwarzania aparatury		
ECTS points	2	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	C.9.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Fundamental knowledge of materials science, mechanics and strength of materials, as well as the forming and assembling of engineering plastics.
		2	Elementary knowledge of the design and working of industrial equipment
		3	Knowledge of technical drawing principles
	Skills	1	Ability to solve basic structural strength issues, use standards and other sources of technical information.
		2	
	Social Competence	1	Ability to independently and creatively solve the engineering tasks posed
		2	

Course Goals To acquire knowledge of the design of basic components of industrial equipment. To familiarize oneself with the design guidelines taking into account strength, operational aspects and formal requirements in the manufacturing and release processes of industrial equipment.

Programme content The course imparts knowledge of the construction, design principles and manufacturing technology of industrial equipment with particular emphasis on equipment subject to technical supervision. Students learn the impact of working conditions and adopted design solutions on the state of stress. They get acquainted with the guidelines for the selection of construction materials suitable for operation in difficult conditions. They learn the principles and scope of technical supervision. Students acquire practical skills related to the methodology of conducting strength calculations of standard structural elements, in accordance with the guidelines of technical supervision in this regard. They learn the principles and scope of technical supervision. They develop selected documents of technical and technological documentation of equipment

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student knows the methodology of structural calculations of industrial equipment, knows the techniques of forming, welding and assembly of equipment	ME_K2_W04	P	C L
	2	The student knows the methodology of structural calculations of industrial apparatus, knows the techniques of forming, welding and assembly of apparatus. Has specialized knowledge of materials engineering materials and their suitability in equipment building	ME_K2_W03	P	C L
	3	Knows the procedures and requirements related to the supervision of the process of design, manufacture and use of the industrial equipment	ME_K2_W05	P	C L
Skills	1	The student is prepared to work in design offices and in the manufacture of process equipment also in terms of knowledge of the applicable procedural requirements	ME_K2_U07	P	C L
	2	can - according to the given specification - design an industrial equipment, using the recommended procedures and design tools	ME_K2_U09	P	L
Social Competence	1	The student is aware of the consequences of decisions made in the process of constructing industrial apparatus in relation to their safe use	ME_K2_K03	P	C L
	2	He/she thinks and acts independently when solving typical engineering tasks concerning the design of industrial equipment.	ME_K2_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 hab. inż. Dyga Roman
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

dr hab. inż. Hapanowicz Jerzy
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(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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third

Course Title	Diagnostic systems for machines
Nazwa przedmiotu	Systemy diagnostyczne maszyn

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

Course code	C.17.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	He/She has knowledge of physics, including the basics of mechanics, thermodynamics, optics, electricity and magnetism, including knowledge needed to understand the description and use of physical phenomena in the operation of mechanical systems
		2	
	Skills	1	He/She is able to use measuring equipment and estimation methods measurement errors
		2	He/She has the ability to self-educate
	Social Competence	1	He/She is aware of supplementing knowledge throughout life and is able to select appropriate learning methods for themselves and other people
		2	

Course Goals To familiarize students with the methodology and systems used in machine diagnostics.

Programme content The role of technical diagnostics in the process of monitoring and assessing the technical condition of machine elements. Artificial intelligence methods in the diagnosis of machines and devices. Measurement sensors in monitoring and diagnostic systems. The use of genetic algorithms and fuzzy systems in diagnostic 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	He/She has in-depth knowledge of the life cycle of mechanical devices	ME_K2_W07	W L	C H
	2	He/She has in-depth, theoretically based knowledge of examining the condition of machines	ME_K2_W03	W L	C H
Skills	1	He/She is able to assess the usefulness and possibility of using various techniques and technologies in diagnosing the condition of machines and devices	ME_k2_U03	L	H
	2	He/She uses analytical and experimental methods to formulate and solve engineering tasks	ME_K2_U04	L	H
Social Competence	1	He/She is aware of the responsibility related to decisions made as part of engineering activities and assessment of the technical condition of machines	ME_K2_K03	L	C I
	2	He/She is aware of the need to supplement specialist knowledge throughout life	ME_K2_K01	L	I

Methods of verification of learning outcomes:

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

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Prażnowski Krzysztof
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	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 hab. inż. Augustynowicz Andrzej
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First
Course Title	Digital Modelling of Machines

Nazwa przedmiotu	Modelowanie cyfrowe maszyn		
ECTS points	2	Subject type	K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	B.1.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	He/She knows differential and integral calculus
		2	He/She knows mechanics - statics, kinematics, elements of dynamics
		3	He/She has knowledge of the strength of materials and the basics of machine construction
	Skills	1	He/She is able to use software supporting numerical and symbolic calculations
		2	He/She knows English at a basic, passive level
	Social Competence	1	He/She is aware of the need to supplement specialist knowledge
		2	He/She can comprehensively analyze and effectively implement the assigned design task or technical problem

Course Goals The course aims to familiarize students with methods of modeling complex mechanical systems. Principles of simplifying systems. Study of the influence of design parameters on the operation of the analyzed systems.

Programme content Methods for digital modeling of complex mechanical systems: principles of reduction, methods of building physical and mathematical models

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	A student has in-depth knowledge in the modelling and construction of machines using computer techniques	ME_K2_W04	W P	D L
	2	A student has in-depth knowledge of mathematics that enables solving problems in the design, manufacture and operation of machines	ME_K2_W01	W P	D L
Skills	1	A student use analytical, simulation and experimental methods to formulate and solve engineering tasks	ME_K2_U02	W P	D L
	2	A student Skilfully communicates using different techniques in professional and other environments	ME_K2_U04	W P	D L
Social Competence	1	A student is aware of the need to improve their specialist knowledge throughout life and is able to select the appropriate knowledge sources and learning methods for themselves and others	ME_K2_K01	W P	D L
	2	A student is aware of the responsibility for decisions made as part of the engineering and managerial activity, especially in terms of their own and other peoples' safety and environmental protection	ME_K2_K03	W P	D 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)	15	dr hab. inż. Lachowicz Cyprian
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	8
Preparation of a report/paper/ project/presentation	5
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. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third
Course Title	Diploma seminar
Nazwa przedmiotu	Seminarium dyplomowe

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

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

Preliminary requirements of the course	Knowledge	1	S/he has theoretically organized general knowledge of subjects included in the study program
		2	
	Skills	1	S/he can obtain information from literature and the Internet
		2	S/he is able to prepare a multimedia presentation
	Social Competence	1	S/he can think creatively and can think creatively
		2	S/he is able to use information and communication techniques to accomplish assigned tasks

Course Goals The aim of the seminar is to review the most important issues covered during studies and to prepare for the defense of the master's thesis.

Programme content Methodology of preparing a master's thesis. Preparation for the exam and analysis of issues for the diploma exam.

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	S/he has extended knowledge necessary to understand the economic, legal and other non-technical conditions of engineering activities	ME_K2_W08	S	N O P R
	2	S/he has extensive knowledge in the field of intellectual property protection	ME_K2_W10	S	N O P R
Skills	1	Efficiently obtains information from domestic and foreign literature and other sources, is able to integrate the information obtained, interpret it and draw conclusions	ME_K2_U01	S	N O P R
	2	Is proficient in using information and communication techniques appropriate to perform engineering tasks, and in particular is able to prepare multimedia presentations on technical issues	ME_k2_U03	S	N O P R
Social Competence	1	Is aware of the need for lifelong education and is able to select appropriate sources of knowledge and learning methods for themselves	ME_K2_K01	S	N O P R
	2	Is aware of the importance of professional conduct, compliance with the principles of professional ethics and teamwork	ME_K2_K04	S	N O P R

Methods of verification of learning outcomes:

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

Hours in the study plan

The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	0	dr hab. inż. Robak Grzegorz
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	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. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second
Course Title	Diploma thesis

Nazwa przedmiotu	Praca dyplomowa		
ECTS points	5	Subject type	W-K
Language of lecture	angielski	Mode of completing the course	Course credit
Course code	C.19.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	General knowledge acquired on previous objects.
		2	
	Skills	1	General skills acquired on previously implemented items.
		2	
	Social Competence	1	General competences acquired on previous objects.
		2	

Course Goals The basic aim of the diploma thesis is to check the degree of competence acquired during studies. Teach the student how to search for source material and use them properly. Teaching the student to prepare extensive reports describing the work carried out. To teach how to write a technical text and especially to present the assumptions, goals and methodology of solving a problem in a dissertation.

Programme content Analysis of the topic of the master's thesis. Collecting literature related to the topic of the work. Developing a concept and method of solving the problem posed in the topic of the work, as well as developing a work implementation plan.

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	S/he has knowledge to perform the necessary calculations and analyzes	ME_K2_W06	P	K R
	2	S/he can use the necessary knowledge to carry out the economic analysis necessary for the completion of his master's thesis	ME_K2_W08	P	K R
Skills	1	S/he can do an analysis of the subject matter of a dissertation thesis, as well as search for relevant literature items and subject them to a direct analysis.	ME_K2_U06	P	K R
	2	S/he can plan and carry out necessary simulation and experimental studies	ME_K2_U04	P	K R
Social Competence	1	S/he possesses and understands the need for continuous learning.	ME_K2_K01	P	K R
	2	The student is able to pass on the acquired knowledge of the construction and operation of machines	ME_K2_K06	P	K 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. Małecka 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)	0
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	0
Seminar (S)	0
Preparation for classes	50
Preparation of a report/paper/ project/presentation	9
Independent study of the course topics	65
Examination or final colloquium	1
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. Małecka Joanna
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	Mechanical Engineering

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

Course Title	Diploma thesis
Nazwa przedmiotu	Praca dyplomowa

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

Course code	C.19.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	General knowledge acquired on previously completed subjects
		2	
	Skills	1	General skills acquired in previously completed subjects
		2	
	Social Competence	1	General competences acquired in previously conducted subjects
		2	

Course Goals Course Goals The basic aim of the diploma thesis is to check the degree of competence acquired during studies. Teach the student how to search for source material and use them properly. Teaching the student to prepare extensive reports describing the work carried out. To teach how to write a technical text and especially to present the assumptions, goals and methodology of solving a problem in a dissertation

Programme content Solution to the problem posed in the topic of the master's thesis. Development of the obtained calculation results of the proposed solution and their critical analysis. Solution to the engineering problem posed in the topic of the master's thesis. Development of the obtained solution results and their critical analysis. Preparation of final conclusions.

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 to perform the necessary calculations and analyzes	ME_K2_W06	P	B K R
	2	The student can use the necessary knowledge to carry out the economic analysis necessary for the completion of his master's thesis	ME_K2_W08	P	K R
Skills	1	A student can do an analysis of the subject matter of a dissertation thesis, as well as search for relevant literature items and subject them to a direct analysis	ME_K2_U01	P	B K R
	2	The student able to take into account the economic aspects of the projects	ME_K2_U06	P	B K R
	3	The student can plan and carry out necessary simulation and experimental studies	ME_K2_U04	P	B K R
Social Competence	1	A student possesses and understands the need for continuous learning.	ME_K2_K01	P	B K R
	2	The student is able to pass on the acquired knowledge of the construction and operation of machines	ME_K2_K06	P	B K 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. Kluger Krzysztof
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	120
Preparation of a report/paper/ project/presentation	9
Independent study of the course topics	250
Examination or final colloquium	1
Additional contact hours	0
Total student workload	380
Number of contact hours (from the study plan)	0

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second
Course Title	Electrical machine drives
Nazwa przedmiotu	Napędy elektryczne maszyn

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

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

Preliminary requirements of the course	Knowledge	1	He/She has basic knowledge of mathematics and physics
		2	
	Skills	1	He/She can make and read an electrical diagram
		2	
	Social Competence	1	He/She is aware of the need to supplement specialist knowledge throughout life and can select appropriate sources of knowledge and teaching methods for themselves and other
		2	

Course Goals Learning the basic characteristics of electrical machines and working machines. Gaining knowledge about the basics of electric drive

Programme content As part of the course, students learn about various electric drives used in industrial machines. They learn the principles of operation of electric machines and the characteristics of selected electric drives. They will also learn how to select the appropriate drive for selected machines and how to control this drive.

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	He/She knows development trends and the most important new achievements in the field of electrical engineering	ME_K2_W01	W L	C H I J P R
	2	The student has in-depth knowledge of electric drive. Knows the basic characteristics of electrical and work machines, as well as methods of regulating drive system parameters.	ME_K2_W06	W L	C H I J P R
Skills	1	He/She is able to work individually and in a team, able to assess the time-consuming nature of a task, can drive a small team in a way that ensures the completion of the task on time.	ME_K2_U12	L	H I J P R
	2	The student can analyze the operation of simple electric drive automation systems, interpret measurement results, and compare individual solutions based on set simple criteria.	ME_K2_U01	L	H I J P R
Social Competence	1	He/She needs continuous self-education and studying the literature on the subject.	ME_K2_K01	W L	C H P R
	2	He/She can cooperate and work in a group, take on various roles in it, and define priorities for implementing a specific task	ME_K2_K06	W L	C H I J P R

Methods of verification of learning outcomes:

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

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

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	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	15
Independent study of the course topics	5
Examination or final colloquium	0
Additional contact hours	0
Total student workload	55
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Augustynowicz Andrzej
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second

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

Preliminary requirements of the course	Knowledge	1	A student has lexical and grammar knowledge at B2 level according to European Language Level scale (CEFR) of foreign languages.
		2	
	Skills	1	A student can use a foreign language in a communicative manner at B2 level according to European Language Level scale (CEFR)Językowego.
		2	
	Social Competence	1	A studend understands the need for self-study.
		2	A student can cooperate in 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 European Language Level scale (CEFR)Europejskiego Systemu Opisu Kształcenia Językowego.

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

Learning outcomes for the course - after completing the training cycle			The reference to the learning outcomes	Form of course (W, C, L, P, S)	Methods of verification of learning outcomes
Knowledge	1	The student understands foreign language theory and terminology well enough to use the foreign language at C level of the Common European Framework of Reference for Languages	ME_K2_W11	L	C E F P
	2				
Skills	1	The student has self-study skills	ME_K2_U13	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 and at a higher level within the specialist terminology.	ME_K2_U14	L	C E F P
Social Competence	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	ME_K2_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	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	58
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	Mechanical Engineering
Profil kształcenia	Ogólnoakademicki
Poziom studiów	Studia drugiego stopnia
Specjalność	Computer Aided Engineering
Forma studiów	Studia stacjonarne
Semestr studiów	Drugi

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	D.1.	Przedmiot powiązany z badaniami naukowymi/ prakt. przygot. zawodowym (T/N)	N

Oczekiwania wstępne w zakresie przedmiotu	Wiedza	1	
		2	
	Umiejętności	1	
		2	
	Kompetencje społeczne	1	
		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 has 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	ME_K2_W05	L	C E F P
	2				
Umiejętności	1	A student has self-study skills	ME_K2_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.	ME_k2_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	ME_K2_K01	L	P
	2	A student understands the importance of teamwork and is able to take responsibility for the results of joint activities	ME_K2_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)

Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third
Course Title	Frequency characteristics of machine elements
Nazwa przedmiotu	Charakterystyki częstotliwościowe elementów maszyn

ECTS points	2	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	C.12.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	Knows the basic principles of the finite element method
		2	Knows the methodology of model description of natural objects
	Skills	1	Can use design support tools
		2	
	Social Competence	1	Is aware of the need to supplement specialized knowledge
		2	Is able to select appropriate sources of knowledge and methods of teaching

Course Goals The purpose of the course is to familiarize students with the use of frequency characteristics of machine components to evaluate the condition of the object under study, the experimental tools and computer methods that make it possible to carry them out, and the information that can be obtained about the analyzed object during this type of analysis.

Programme content The educational content implemented in this class deals with issues related to the determination of frequency characteristics of real objects. Measurement signal analysis and vibration measurements of the real object. The content also deals with the construction of computational tools for the implementation of measurement signal analysis.

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	Knows how to analyze vibrations of natural objects	ME_K2_W02	W L	C F I
	2	Knows the tools to create a digital representation of the analyzed objects	ME_K2_W04	L	C F I
Skills	1	Can use specialized software to analyze measurement signals	ME_k2_U03	L	C F I
	2	Can create a suitable tool for the implementation of an experimental procedure	ME_K2_U09	W L	C F I
	3	Can correctly verify the correctness of the results of numerical analyses	ME_K2_U12	W L	C F I
Social Competence	1	Can critically evaluate the results of experimental and numerical studies conducted	ME_K2_K01	W L	C F
	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. Owsiński Robert
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	0
Independent study of the course topics	15
Examination or final colloquium	0
Additional contact hours	0
Total student workload	60
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic

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

Course Title	Humanistic and social subject I
Nazwa przedmiotu	Przedmiot humanistyczno-społeczny I

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

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

Preliminary requirements of the course	Knowledge	1	No requirements
		2	
	Skills	1	Ability to analyze the topics discussed
		2	
	Social Competence	1	Openness to expanding and deepening your knowledge and skills
		2	

Course Goals The aim of the course is for the student to acquire knowledge of selected humanities or social issues

Programme content The subject covers selected humanities or social issues A humanities or social sciences subject chosen from the faculty or university database.

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	S/he has knowledge of selected humanities or social issues	ME_K2_W08	W	C D
	2				
Skills	1				
	2				
Social Competence	1	S/he he becomes a person competent to communicate to his social environment the existence of new, revolutionary changes in the understanding of the universe and the position of man in universe.	ME_K2_K02	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)	30	dr inż. Owsiński Robert
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	25
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. Kluger Krzysztof
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Mechanical Engineering
Profile of Education	General Academic

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

Course Title	Humanistic and social subject II
Nazwa przedmiotu	Przedmiot humanistyczno-społeczny II

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

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

Preliminary requirements of the course	Knowledge	1	No requirements
		2	
	Skills	1	Ability to analyze the topics discussed
		2	
	Social Competence	1	Openness to expanding and deepening your knowledge and skills
		2	

Course Goals The aim of the course is for the student to acquire knowledge of selected humanities or social issues

Programme content The subject covers selected humanities or social issues A humanities or social sciences subject selected from the faculty or university database.

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	Has the knowledge necessary to understand the social, non-technical conditions of creative work within design issues and the impact of the forms of designed objects on their reception and perception	ME_K2_W08	W	C D
	2				
Skills	1				
	2				
Social Competence	1	Understands the essence of non-technical aspects when designing machines and devices.	ME_K2_K02	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)	30	dr inż. Owsiński Robert
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	0	
Seminar (S)	0	

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

* hour (class) means 45 minutes

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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Mechanical Engineering
Profile of Education	General Academic

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

Course Title	Hydraulic and pneumatic systems in manufacturing machines
Nazwa przedmiotu	Układy hydrauliczne i pneumatyczne w maszynach wytwórczych

ECTS points	2	Subject type	K
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	General knowledge of solid, liquid, and gas physics, Basic knowledge in the field of fluid flow
		2	
	Skills	1	Ability to analyze the operation of systems based on simple diagrams, Basic skills in performing algebraic operations, ability to use computational software packages and CAD
		2	
	Social Competence	1	Ability to acquire information, collaborate in a group
		2	

Course Goals Preparing students for the analysis of construction, operation, and design of hydraulic and pneumatic systems in machinery

Programme content Advanced knowledge of components of pneumatic and hydraulic systems in terms of their construction, operation, calculation, and design such as pumps, motors, actuators, accumulators, control valves

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	Has solid and in-depth knowledge related to selected issues in the operation, construction, and servicing of pneumatic and hydraulic systems in machinery	ME_K2_W06	W	C
	2				
Skills	1	Designs and improves systems necessary for performing engineering tasks considering non-technical aspects in the field of hydraulic and pneumatic systems	ME_K2_U10	P	L
	2	A student can lead a group	ME_K2_U15	P	P
Social Competence	1	Aware of the responsibility associated with decisions made in engineering and managerial activities, especially in terms of personal safety and the safety of others, as well as environmental protection	ME_K2_K03	P	L
	2				

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Bieniek Andrzej
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. Augustynowicz Andrzej
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

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

Course Title	Industrial standards in design
Nazwa przedmiotu	Normy przemysłowe w projektowaniu

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

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

Preliminary requirements of the course	Knowledge	1	Understands the principles of creating technical drawings.
		2	Knows the basic definitions and relationships presented during the courses on material strength and the basics of machine design.
	Skills	1	Is able to read technical drawings.
		2	Can prepare detailed and assembly drawings.
		3	Is capable of solving basic tasks in the field of material strength.
	Social Competence	1	Comprehends the necessity of adhering to regulations when creating technical documentation.
		2	Can distinguish individual parts of an assembly and describe their relationships.

Course Goals Preparing students for design work utilizing industry standards. Acquainting students with norms for various industrial sectors.

Programme content Standardization of structural elements. Definition of a standard, source of law. Application of standards during calculations and the preparation of technical documentation. Discussion of design processes in accordance with PN-ISO, EUROCODE, ASTM, ASME, ABS, IEC standards.

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	Has knowledge about industrial standards applied for calculations during structural design.	ME_K2_W01	W L	C D H P R
	2	Has knowledge about industrial standards applied in preparing technical documentation during structural design.	ME_K2_W03	W L	C D H P R
	3	Has knowledge about assessing the suitability of applying specific industrial standards in engineering practice.	ME_K2_W08	W L	C D H P R
	4	Is knowledgeable about the impact of applying industrial standards on the quality of designed devices.	ME_K2_W09	W L	C D H P R
Skills	1	Is able to acquire information about industrial standards using databases and available external sources.	ME_K2_U01	W L	C D H P R
	2	Has practical ability to prepare construction projects using analytical methods while adhering to industrial standards.	ME_K2_U04	W L	C D H P R
	3	Is able to assess the suitability of a standard and its potential utilization in the scope of designing and manufacturing machinery and equipment.	ME_K2_U12	W L	C D H P R
Social Competence	1	Is capable of consolidating and conveying information about industrial standards.	ME_K2_K01	W L	C D H P R
	2	Understands that adhering to industrial standards is part of their social responsibility as an engineer.	ME_K2_K03	W L	C D H P R
	3	Is aware of the importance of professional conduct, particularly regarding the application of industrial standards.	ME_K2_K04	W L	C D H P R

Methods of verification of learning outcomes:

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

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

Lecture (W)	15	dr inż. Kowalski Mateusz
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	10
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)	45

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second
Course Title	Machine elements technology
Nazwa przedmiotu	Technologia elementów maszyn

ECTS points	2	Subject type	W-K

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)	T

Preliminary requirements of the course	Knowledge	1	Knows the basics of loss and non-loss machining.
		2	
	Skills	1	Can determine the effect of using basic manufacturing techniques.
		2	
	Social Competence	1	Can analyze the tasks assigned to be carried out.
		2	Is aware of the responsibility and consequences of decisions made.

Course Goals Obtaining knowledge and practical experience in processes related to machine element technology

Programme content Structural diagram of the technological process with its components. Technology of corps class items. Homing, fixing and fastening body class objects. Machining of large-size bodies. Technology of gear machining. Designing technological processes for CNC machine 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	Has established and expanded knowledge related to selected technologies for a wide range of machine components	ME_K2_W06	W P	A K
	2				
Skills	1	Efficiently obtains information from the literature, databases and other sources, is able to integrate the obtained information, interpret it, as well as draw conclusions and formulate and justify opinions	ME_K2_U01	W P	A K
	2				
Social Competence	1	Is able to demonstrate entrepreneurship and ingenuity in action related to the implementation of professional tasks	ME_K2_K05	W P	A K
	2				

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Niesłony Piotr
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	5
Independent study of the course topics	3
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. Małecka Joanna
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second

Course Title	Machine tool programming including CAM systems			
Nazwa przedmiotu	Programowanie obrabiarek wraz z systemami CAM			
ECTS points	3	Subject type		W-K
Language of lecture	angielski	Mode of completing the course		Examination
Course code	C.2.	Subject related to scientific research/pract. profess. prepar. (Y/N)		T

Preliminary requirements of the course	Knowledge	1	He/She has knowledge of the basics of cavity machining and machine tool construction.
		2	He/She has basic knowledge of CNC machine tool programming.
		3	He/She has knowledge of technical drawing and drafting geometry.
	Skills	1	He/She can determine the effect of basic manufacturing techniques.
		2	He/She can prepare the technological process of machine components.
		3	He/She can interpret the markings on the technical drawing.
	Social Competence	1	He/She is able to analyze the tasks assigned for implementation.
		2	He/She is aware of the responsibilities and consequences associated with his decisions.
		3	He/She understand the need to learn and acquire new knowledge of programming numerically controlled machine tools.

Course Goals Learn methods of programming numerically controlled machine tools using control system software.

Programme content Lecture covering methods of programming machining on CNC machines. Overview of CNC machine control systems and CAD/CAM systems in terms of machining technology. Use of contour lines, subroutines and machining cycles. Exercises in the computer lab: working a machining program for a component on a CNC lathe and milling machine.

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	He/She knows how to program technological processes using CNC machines.	ME_K2_W04	W C L	C H I
	2	He/She has a structured knowledge of the stages of automatic programming of numerically controlled machine tools.	ME_K2_W04	W C L	C H I
	3	He/She has knowledge of the capabilities of modern computer-aided manufacturing programs.	ME_K2_W05	W C L	C H I
Skills	1	He/She is skilled in programming the cavity forming process using turning, milling in selected computer software.	ME_k2_U03	C L	C H I
	2	He/She can select manufacturing technology to shape the form, structure and properties of components.	ME_K2_U05	W C L	C H I
	3	He/She is skilled in creating cutting tool databases in selected computer software.	ME_K2_U10	C L	C H I
	4	A student can lead a group	ME_K2_U15	L	P
Social Competence	1	He/She is aware of independent acquisition of knowledge and improvement of professional competence.	ME_K2_K01	W C L	C H I
	2	He/She is aware of the responsibility associated with decisions made in engineering activities, with particular emphasis on the consequences of these decisions.	ME_K2_K03	C L	H I
	3	He/She recognizes the limitations of available methods and tools.	ME_K2_K06	C L	H I

Methods of verification of learning outcomes:

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

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

Lecture (W)	15	dr inż. Chudy Roman
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	8
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	10
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. Małecka Joanna
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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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First
Course Title	Manufacturing Process Modeling
Nazwa przedmiotu	Modelowanie procesów wytwarzania

ECTS points	3	Subject type	K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	B.3.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	S/he has knowledge of machine technology.
		2	
	Skills	1	S/he is able to determine the effect of using basic manufacturing techniques.
		2	
	Social Competence	1	S/he is able to analyze the tasks assigned to be carried out.
		2	

Course Goals To familiarize students with the issues of numerical modeling in machining processes.

Programme content Analysis of the machining process in terms of the possibility of using numerical simulations to evaluate the process. Geometric modeling of the machining process. Constitutive models of materials. Methods of programming MES models from a technological perspective. Interpretation of the results of numerical simulations of machining processes. Programs for numerical modeling of machining 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	S/he has in-depth knowledge of numerical techniques supporting manufacturing processes	ME_K2_W05	W P	C L
	2				
Skills	1	S/he is able to formulate and test hypotheses related to engineering problems in FEM modeling and complex research problems in the construction and operation of machines	ME_K2_U11	W P	C L
	2				
Social Competence	1	S/he is aware of the need to supplement specialist knowledge throughout life and is able to select appropriate sources of knowledge and learning methods for themselves and others	ME_K2_K01	W P	C L
	2				

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Niesłony Piotr
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	20
Preparation of a report/paper/ project/presentation	18
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)	30

* hour (class) means 45 minutes

dr hab. inż. Małecka Joanna
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First

Course Title	Material design			
Nazwa przedmiotu	Projektowanie materiałów			
ECTS points	3	Subject type		K
Language of lecture	angielski	Mode of completing the course		Course credit
Course code	B.2.		Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Has basic knowledge of materials science and durability materials, material technologies.
		2	
	Skills	1	Has the ability to think logically and use information obtained from the library and the Internet.
		2	
	Social Competence	1	Understands the need to learn and acquire new knowledge.
		2	

Course Goals Theoretical and practical problems of designing materials and technological processes to ensure the required functional properties of products.

Programme content Properties of construction materials and practical ability to predict their behavior under operating conditions.

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	Has theoretically based general knowledge of materials engineering, thanks to which he is able to describe the basic functional properties of materials and factors affecting the properties of materials	ME_K2_W03	W L	D E P R
	2	Is able to describe the criteria for selecting engineering materials for technical applications	ME_K2_W08	W L	D E P R
	3	Knows material design and selection methods process technologies for producing products for practical applications	ME_K2_W05	W L	D E P R
Skills	1	Is able to integrate knowledge from materials engineering when formulating and solving engineering tasks.	ME_k2_U03	W L	D E H P R
	2	Is able to design engineering materials and produce materials with the required physicochemical and functional properties.	ME_K2_U04	W L	D E H P R
Social Competence	1	Can think creatively.	ME_K2_K05	L	D H P R
	2	Is able to set priorities for implementing a specific task.	ME_K2_K06	W L	D P R

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr hab. inż. Małecka Joanna
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	18
Independent study of the course topics	15
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. Małecka Joanna
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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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second
Course Title	Modern forming technologies
Nazwa przedmiotu	Nowoczesne technologie kształtowania

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

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

Preliminary requirements of the course	Knowledge	1	S/he knows the basics of machine construction and machine parts.
		2	
	Skills	1	S/he can determine the effect of using basic manufacturing techniques
		2	
	Social Competence	1	S/he is able to analyze the tasks assigned to be carried out.
		2	S/he is aware of the responsibility and consequences of decisions made.

Course Goals They are providing students with knowledge and gaining practical skills in new methods of shaping machine elements.

Programme content Processing of the material in the hardened state. Polygonal turning. Cooling and lubrication problems in the cutting zone - dry machining, MQL, MQCL, cryogenic machining. Practical application of methods of rapid prototyping. High-energy treatments. Explosive plating. The use of a laser in shaping machine elements. Laser texturing. Production of machine elements using powder metallurgy 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	S/he has in-depth, theoretically based knowledge of modern manufacturing techniques needed to understand and describe phenomena occurring in the production and operation of machine elements	ME_K2_W06	W L	C H
	2				
Skills	1	S/he is able to assess the usefulness and possibility of using various techniques and technologies in the design and production of machines and devices	ME_K2_U12	W L	C H
	2				
Social Competence	1	S/he ible to demonstrate entrepreneurship and ingenuity in activities related to the implementation of professional tasks	ME_K2_K05	W L	C H
	2				

Methods of verification of learning outcomes:

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

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

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

Student workload	
Types of student activities*	Average number of hours* allocated on completed activities
Lecture (W)	30
Calculation class (C)	0
Laboratory class (L)	30
Project (P)	0
Seminar (S)	0
Preparation for classes	20
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	8
Examination or final colloquium	2
Additional contact hours	0
Total student workload	100
Number of contact hours (from the study plan)	60

* 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	Mechanical Engineering		
Profile of Education	General Academic		
Level of study	Second Cycle Studies		
Specialization	Computer Aided Engineering		
Form of Study	Full-Time Studies		
Semester	Second		
Course Title	Optimization in machine design		
Nazwa przedmiotu	Optymalizacja w projektowaniu maszyn		
ECTS points	3	Subject type	W-K

Language of lecture	angielski	Mode of completing the course	Course credit
Course code	C.6.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	The student possesses knowledge in the field of CAD design methodology and finite element analysis (FEA).
		2	
	Skills	1	The student has skills in parametric CAD design and proper definition and solution of tasks for FEA analysis.
		2	
	Social Competence	1	The student is aware of the need for further knowledge enhancement.
		2	

Course Goals Familiarization of students with methods of machine and device construction optimization. Practical application of optimization methods in the design process.

Programme content Optimization criteria in machine design. Utilization of CAE software in the optimization process. Computer-aided optimization. Optimization in design based on manufacturing technology. Examples of optimization in machine design.

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	Possesses specialized knowledge in the optimization of machine constructions.	ME_K2_W04	W L	C P
	2				
Skills	1	Capable of formulating and solving optimization tasks.	ME_K2_U04	W L	C P
	2				
Social Competence	1	Able to work collaboratively in project tasks execution.	ME_K2_K05	L	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)	15	dr inż. Kowalski Mateusz
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	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	75
Number of contact hours (from the study plan)	45

* hour (class) means 45 minutes

dr hab. inż. Kluger Krzysztof
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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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	First
Course Title	Repair technology

Nazwa przedmiotu	Technologia napraw		
ECTS points	3	Subject type	K
Language of lecture	angielski	Mode of completing the course	Examination
Course code	B.6.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	Has knowledge of engineering materials and new technologies
		2	
	Skills	1	Is able to identify and formulate specifications for simple engineering tasks of a practical nature in the design of machines and devices.
		2	
	Social Competence	1	Understands non-technical aspects of a mechanical engineer's activity, impact on the environment and user safety
		2	

Course Goals Preparing students to look for new methods of repairing machines and devices.

Programme content Discussion of the basic characteristics and definitions of maintenance and repair work. Using artificial intelligence to plan and carry out machine renovation works. Methods and principles of inspection after repair.

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	Has in-depth, theoretically based knowledge of engineering materials used in machine construction, their properties and development trends in this area.	ME_K2_W03	W P	A L
	2				
Skills	1	Is able to analyze and evaluate the functioning of technical solutions: devices, facilities, systems, processes and repair services.	ME_K2_U07	W P	K
	2				
Social Competence	1	Is aware of the responsibility related to decisions made as part of engineering and managerial activities, especially in terms of the safety of oneself and other people.	ME_K2_K03	W P	A K
	2				

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	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)	15
Calculation class (C)	0
Laboratory class (L)	0
Project (P)	15
Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	10
Independent study of the course topics	20
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. Augustynowicz Andrzej
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	Mechanical Engineering
Profile of Education	General Academic

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

Course Title	Research Methodology
Nazwa przedmiotu	Metodologia prowadzenia badań

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

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

Preliminary requirements of the course	Knowledge	1	The student has extended knowledge of development trends in the design, manufacture and operation of machines and mechanical devices
		2	
	Skills	1	A student designs and streamlines the processes, facilities or systems necessary to perform engineering tasks, taking into account non-technical aspects
		2	
	Social Competence	1	A student is aware of the responsibility for decisions made as part of the engineering and managerial activity, especially in terms of their own and other peoples' safety and environmental protection
		2	

Course Goals The aim of the classes is: • providing knowledge about the principles of conducting empirical research using simulation and laboratory methods, • learning about modern measurement methods and measuring devices, • acquiring skills in the use of selected specialized measuring devices.

Programme content Knowledge is provided regarding the stages of the research process and methods of conducting research. The student acquires skills in identifying processes and systems. He also acquires skills in developing, analyzing and presenting the obtained research results. The student becomes familiar with the legal and ethical aspects of scientific research.

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 solid, in-depth knowledge of selected issues in the functioning, construction, maintenance, technical diagnostics, repair technology and safe use of machines and devices	ME_K2_W06	W	D
	2	A student has in-depth knowledge necessary to understand the social, economic, legal, ecological and other non-technical aspects of engineering activity.	ME_K2_W08	W	D
Skills	1	A student uses analytical, simulation and experimental methods to formulate and solve engineering tasks	ME_K2_U04	P	D H
	2	A student is well prepared for work in an industrial environment	ME_K2_U05	P	D H
Social Competence	1	A student is aware of the need to improve their specialist knowledge throughout life and is able to select the appropriate knowledge sources and learning methods for themselves and others	ME_K2_K01	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)	15	dr hab. inż. Augustynowicz Andrzej
Calculation class (C)	0	
Laboratory class (L)	0	
Project (P)	15	
Seminar (S)	0	

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

Seminar (S)	0
Preparation for classes	15
Preparation of a report/paper/ project/presentation	10
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. Augustynowicz Andrzej
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	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third
Course Title	Reverse engineering
Nazwa przedmiotu	Inżynieria odwrotna

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

Course code	C.14.	Subject related to scientific research/pract. profess. prepar. (Y/N)	T

Preliminary requirements of the course	Knowledge	1	S/he has knowledge of technical drawing and drafting geometry.
		2	S/he knows the principles of design using CAD programs.
		3	S/he has a structured knowledge of structural modeling.
	Skills	1	S/he is able to prepare technical documentation in the form of manufacturing and assembly drawings.
		2	
	Social Competence	1	S/he is aware of the need to supplement knowledge throughout life.
		2	S/he is able to analyze the tasks assigned for implementation.

Course Goals The purpose of the course is to familiarize students with modern technologies related to reverse engineering for the restoration of documentation of elements of engineering structures.

Programme content Lecture on reverse engineering and the method of digitizing objects. Presentation of equipment used in reverse engineering. Reverse engineering in industrial applications. Practical laboratory classes, classes in the computer laboratory: measurement of an element with a scanner, editing of the obtained point cloud, creation and verification of the obtained model.

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	S/he has an advanced understanding of the principles of engineering design of products, objects, technical processes, operation and manufacture of machinery using computer-aided design.	ME_K2_W04	W L	C H I
	2	S/he he knows methods and tools to describe products, processes and relations between them.	ME_K2_W06	W L	C H I
Skills	1	Able to acquire the required information about the actual object, which can then be used to accurately reproduce that object.	ME_K2_U07	L	H I
	2	Able to use data obtained from reverse engineering to test the quality of finished products or conformance to a standard (norm).	ME_K2_U12	W L	C H I
	3	Can plan and conduct experiments, including measurements and computer simulations; interpret the results obtained and draw conclusions using analytical, simulation and experimental methods.	ME_K2_U04	L	H I
Social Competence	1	S/he can obtain, information from textbooks, journals, databases and the Internet, critically evaluate, select and arrange it in a logical manner.	ME_K2_K01	W L	C H I
	2	S/he is able to seek solutions to theoretical and practical tasks according to specific priorities to achieve the assigned tasks.	ME_K2_K05	W L	C H I

Methods of verification of learning outcomes:

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

Hours in the study plan		
The course format	Hours/sem. (h)	Tutor (coordinator) of the course (title/academic degree/professional title, name and surname
Lecture (W)	15	dr inż. Chudy 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)	15
Calculation class (C)	0
Laboratory class (L)	15
Project (P)	0
Seminar (S)	0
Preparation for classes	2
Preparation of a report/paper/ project/presentation	8
Independent study of the course topics	8
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. Małecka Joanna
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Third
Course Title	Systems in operation and maintenance management
Nazwa przedmiotu	Systemy w zarządzaniu eksploatacją i utrzymaniem ruchu

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

Course code	C.18.	Subject related to scientific research/pract. profess. prepar. (Y/N)	N

Preliminary requirements of the course	Knowledge	1	He/She has extensive knowledge of development trends in the field design, manufacture, construction and operation of vehicles and machines
		2	He/She has extended knowledge necessary to understand social, economic, legal, ecological and other non-technical conditions of engineering activities typical for the implemented one specialties
	Skills	1	He/She critically analyzes and evaluates how solutions work technical: devices and vehicles typical in the scope of the project specialties
		2	He/She designs and improves processes, facilities or systems necessary for performing engineering tasks in the field of specialization taking into account non-technical aspects
	Social Competence	1	He/She is aware of the responsibility associated with decisions, undertaken as part of engineering and managerial activities, especially in terms of your own and other people's safety
		2	He/She understands non-technical aspects of the activity of a mechanical engineer and manager, including its social consequences and impact on the environment.

Course Goals Providing structured knowledge and acquiring skills and social competences related to the theoretical and practical aspects of managing the operation of technical facilities and systems, along with computer-aided methods and tools in this task area.

Programme content Analysis of the functioning of the maintenance department based on the general management model and the Business Centered Maintenance strategy. Computer-aided maintenance management and presentation of tools supporting maintenance management. Presentation of the general characteristics of CMMs Computerized Maintenance Management System systems), IT structure and operational properties of CMMs class 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	He/She has well-established and extended knowledge related to: selected issues related to the functioning, construction, operation, diagnosis of technical condition, repair technology and safe use of vehicles and machines.	ME_K2_W03	W	C K L
	2	He/She has extended knowledge necessary to understand the social, economic, legal, ecological and other non-technical conditions of engineering activities typical for the specialty pursued	ME_K2_W08	W P	C K L
Skills	1	He/She has experience in performing economic analyzes of undertaken engineering activities, in particular in relation to issues related to the operation of machines and devices	ME_K2_U06	P	L
	2				
Social Competence	1	He/She is aware of the need to supplement specialist knowledge throughout life and is able to select appropriate sources of knowledge and learning methods for themselves and others	ME_K2_K04	P	K L
	2				

Methods of verification of learning outcomes:

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

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

Project (P)	15
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 hab. inż. Augustynowicz Andrzej
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Opole University of Technology
Faculty of Mechanical Engineering
Course Description Card

Field of study	Mechanical Engineering
Profile of Education	General Academic
Level of study	Second Cycle Studies
Specialization	Computer Aided Engineering
Form of Study	Full-Time Studies
Semester	Second
Course Title	Unconventional drive systems in machines
Nazwa przedmiotu	Niekonwencjonalne układy napędowe w maszynach

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

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

Preliminary requirements of the course	Knowledge	1	S/he has basic knowledge in the field of construction of vehicle drive systems
		2	
	Skills	1	S/he is able to analyze and evaluate the operation of drive systems
		2	
	Social Competence	1	S/he is aware of the need to supplement specialized knowledge throughout life
		2	

Course Goals Analysis of operation and construction of unconventional drive systems

Programme content Selected issues related to the construction, analysis of operation, and design of unconventional drive transmission systems in vehicles and machines

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	S/he has solid and expanded knowledge related to selected issues in the operation and construction of unconventional vehicle drive systems	ME_K2_W06	W	C
	2				
Skills	1	S/he evaluates the usefulness and correctly selects methods and tools best suited for solving engineering tasks in the area of unconventional drive systems	ME_K2_U09	P	L
	2				
Social Competence	1	S/he understands the social role of an engineer and participates in conveying reliable information and opinions to society regarding the development of technology and associated risks related to the use of unconventional drive systems	ME_K2_K06	W P	C L
	2				

Methods of verification of learning outcomes:

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

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

Lecture (W)	15	dr inż. Bieniek Andrzej
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	25
Independent study of the course topics	10
Examination or final colloquium	0
Additional contact hours	0
Total student workload	75
Number of contact hours (from the study plan)	30

* hour (class) means 45 minutes

dr hab. inż. Augustynowicz Andrzej
Head of the organizational unit
(stamp/signature)

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

Wydział Mechaniczny - lista przedmiotów na kierunku Mechanical Engineering - Studia stacjonarne - Studia drugiego stopnia (od 2024) - spec. Computer Aided Engineering

symbol	Additive manufacturing techniques and composites in design	Advanced FEA Techniques	Computational Mechanics	Control in vehicles and autonomous machines	Coordinate Metrology in Quality Engineering	Design of mechanical connections in FEM	Design principles and technology of apparatus manufacture	Diagnostic systems for machines	Digital Modelling of Machines	Diploma seminar	Diploma thesis	Diploma thesis	Electrical machine drives	Foreign language	Foreign language	Frequency characteristics of machine elements	Humanistic and social subject I	Humanistic and social subject II	Hydraulic and pneumatic systems in manufacturing machines	Industrial standards in design	Machine elements technology	Machine tool programming including CAM systems	Manufacturing Process Modeling	Material design	Modern forming technologies	Optimization in machine design	Repair technology	Research Methodology	Reverse engineering	Systems in operation and maintenance management	Unconventional drive systems in machines
ME_K2_W01	X	X	.	.	X	.	.	.	X	.	.	.	X	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.
ME_K2_W02	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_W03	.	.	.	X	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	X	.	.	X	.	X	.
ME_K2_W04	X	.	.	.	.	X	X	.	X	.	.	.	.	.	.	X	.	.	.	.	.	X	.	.	.	X	.	.	X	.
ME_K2_W05	X	.	.	.	.	.	X	.	.	.	.	.	.	.	X	.	.	.	.	.	.	X	X	X	.	.	.	.	.	.
ME_K2_W06	.	.	.	X	.	.	.	.	.	.	X	X	X	.	.	.	.	.	X	.	X	.	.	.	X	.	.	X	X	.
ME_K2_W07	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_W08	.	.	.	.	X	.	.	.	.	X	X	X	.	.	.	.	X	X	.	X	.	.	.	X	.	.	.	X	.	.
ME_K2_W09	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.
ME_K2_W10	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_W11	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_U01	.	.	.	.	.	X	.	.	.	X	.	X	X	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.
ME_K2_U02	.	X	.	.	.	.	.	.	X	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_U03	.	.	.	.	.	.	.	X	.	X	.	.	.	.	X	X	.	.	.	.	.	X	.	X	.	.	.	.	.	.
ME_K2_U04	.	.	.	.	.	.	.	X	X	.	X	X	.	.	.	.	.	.	.	X	.	.	.	X	.	X	.	X	X	.
ME_K2_U05	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	X	.	.
ME_K2_U06	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.
ME_K2_U07	.	.	.	X	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.
ME_K2_U08	X	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_U09	.	.	X	.	X	X	X	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X
ME_K2_U10	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.	.	.	.	.	.	.
ME_K2_U11	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.
ME_K2_U12	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.	.	X	.	.	.	.	X	.	.	.	X	.
ME_K2_U13	X	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_U14	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_U15	X	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	X	.	.	.	.	.	.	.	.
ME_K2_K01	.	.	X	X	X	.	.	X	X	X	X	X	X	X	X	X	.	.	.	X	.	X	X	.	.	.	.	X	X	.
ME_K2_K02	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	X	X	.	.	.	.	.	.	.	.	.	.	.	.
ME_K2_K03	X	.	.	X	.	X	X	X	X	.	.	.	.	.	.	.	.	.	X	X	.	X	.	.	.	.	X	.	.	.
ME_K2_K04	.	.	.	.	X	.	.	.	.	X	.	.	.	.	X	.	.	.	.	X	.	.	.	.	.	.	.	.	.	X
ME_K2_K05	.	X	.	.	.	.	X	.	.	.	.	.	.	.	.	.	.	.	.	.	X	.	.	X	X	X	.	.	X	.
ME_K2_K06	.	.	X	.	.	.	.	.	.	.	X	X	X	.	.	.	.	.	.	.	.	.	X	.	X	.	.	.	.	X

Wiedza - efekty nie pokryte:
Brak

Umiejętności - efekty nie pokryte:
Brak

Kompetencje - efekty nie pokryte:
Brak