Politechnika Krakowska im. Tadeusza Kościuszki

Karta przedmiotu

obowiązuje studentów rozpoczynających studia w roku akademickim 2020/2021

Wydział Inżynierii Środowiska i Energetyki

Kierunek studiów: Inżynieria Środowiska — Profil: Ogólnoakademicki

Forma sudiów: stacjonarne — Kod kierunku: IŚ2

Stopień studiów: II

Specjalności: Environmental and land engineering

1 Informacje o przedmiocie

Nazwa przedmiotu	Applied hydraulics
Nazwa przedmiotu w języku angielskim	Applied hydraulics
Kod przedmiotu	WIŚIE IŚ2 oIIS C4 20/21
Kategoria przedmiotu	Przedmioty kierunkowe
Liczba punktów ECTS	5.00
Semestry	1

2 Rodzaj zajęć, liczba godzin w planie studiów

Semestr	Wykład	Cwiczenia	Laboratoria	Laboratoria komputerowe	Projekt	Seminarium
1	15	20	15	0	0	0

3 Cele przedmiotu

Cel 1 The acquisition of theoretical and practical knowledge in the field of calculation of flow parameters in open channels with particular reference to the transient flow on the example of the hydraulic jump and depression curve effect.

Cel 2 Learning of calculation methods for hydraulic design of: spillways and gated weirs, road culverts, bridges as well as stilling basins and energy dissipation devices

Cel 3 Acquiring the ability to carry out computer simulation of flow conditions prevailing above and below the hydraulic structures such as spillways and road culverts.

4 Wymagania wstępne w zakresie wiedzy, umiejętności i innych kompetencji

1 Basic knowledge in the field of fluid mechanics.

2 Basic skills of computer modeling of flow in open channels.

5 Efekty kształcenia

EK1 Wiedza Getting to know the mathematical description and physical interpretation of the effects of flow through the damming construction.

EK3 Umiejętności Getting the skill to use engineering calculation methods for hydraulic design of spillways, culverts and bridges.

EK4 Umiejętności Gaining the ability to apply engineering calculation methods for hydraulic design of the stilling basins and energy dissipators.

EK5 Umiejętności Gaining the ability to apply computer modelling of flow through the hydraulic structures such as spillways, culverts and bridges

6 Treści programowe

Laboratoria		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
L1	Experimental determination of the rating curve for ogee shaped weir	2
L2	Experimental determination of the rating curve for broad crested weir and its submergence conditions	3
L3	Sluice gate outflow - measurement of conjugated depths and hydraulic jump space and flow characteristics	4
L4	Pipe flow- experimental determination of friction and local energy head loss (comparison with theoretical loss coefficients value magnitudes)	3
L5	Water hammer effect in pipe- pressure wave experimental determination and comparison with theoretical calculation of celerity and pressure amplitude	3

Wykład		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
W1	Supplementing information regarding the mathematical description of the transient flow (such as and hydraulic jump), flow classification according to the Froud number in connection with the hydraulic structures	2

Wykład		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
W2	General characteristics of spillways used on damming constructions and specification of requirements for their capacity	2
W3	Presentation of the calculation procedures for the capacity of various types of weirs shape (ogee, broad crested, shaft, thin-walled and others) for given operating conditions of damming structures	3
W4	Presentation of hydraulic calculations of flow conditions prevailing on spillways and their application for design purposes	2
W5	Presentation of capacity and dimensioning calculations for road culverts and gated bottom spillways installed on small dams. Mathematical description of water hammer effect	3
W6	The theoretical basics of the stilling basin and energy dissipation devices designing	3

Cwiczenia		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
C1	Calculation of dimensions and weirs' parameters for design flow conditions and hydraulic modeling of weirs operating (ogee shapes without level control, gated ogee and broad crested weirs regulated by sluice or segment closing) based on the Hec-Ras software. and closing the gate valve type (c) with a wide crown from the gate valve	5
C2	Numerical simulation of optimal regulation of controlled spillways discharges on a example of a cascade of small objects that perform functions of small power plant and analysis of its effectiveness.	7
C3	Calculation of dimensions and parameters of road culverts based on the design flow discharge and simulation of their impact on flow conditions by using the Hec Ras program	5
C4	Hydraulic design of a stilling basins - calculations based on the mathematical formulas	3

7 Narzędzia dydaktyczne

N1 Narzędzie 1 Materiały do wykładów

N2 Narzędzie 2 Materiały do ćwiczeń

N3 Narzędzie 3 Program komputerowy

8 Obciążenie pracą studenta

Forma aktywności	Średnia liczba godzin na zrealizowanie aktywności
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	50
Konsultacje przedmiotowe	15
Egzaminy i zaliczenia w sesji	5
Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta, w tym:	
Przygotowanie się do zajęć, w tym studiowanie zalecanej literatury	20
Opracowanie wyników	25
Przygotowanie raportu, projektu, prezentacji, dyskusji	10
Sumaryczna liczba godzin dla przedmiotu wynikająca z całego nakładu pracy studenta	**125**
Sumaryczna liczba punktów ECTS dla przedmiotu	5.00

9 Sposoby oceny

Ocena formująca

F1 Evaluation of the realization of individual projects

Ocena podsumowująca

P1 Examination of the students on the basis of a conversation about the projects carried out

Warunki zaliczenia przedmiotu

W1 Attendance in class

W2 Delivering completed projects on time

W3 Providing the correct answer to questions about the exercises

Ocena aktywności bez udziału nauczyciela

B1 Providing the correct answer to questions about a basic theory concepts

Kryteria oceny

Efekt kształcenia 1	
Na ocenę 2.0	Student has not sufficient knowledge in the required scope. He obtained less than 50% correct answers.

Na ocenę 3.0	Student has sufficient knowledge in the required scope. He obtained between 51% -60% correct answers.
Na ocenę 3.5	Student has sufficient knowledge in the required scope. He obtained between 61% -70% correct answers.
Na ocenę 4.0	Student has sufficient knowledge in the required scope. He obtained between 71% -80% correct answers.
Na ocenę 4.5	Student has sufficient knowledge in the required scope. He obtained between 81% -90% correct answers.
Na ocenę 5.0	Student has sufficient knowledge in the required scope. He obtained between 91% -100% correct answers.
Efekt kształcenia 3	
Na ocenę 2.0	Student has not sufficient knowledge in the required scope. He obtained less than 50% correct answers.
Na ocenę 3.0	Student has sufficient knowledge in the required scope. He obtained between 51% -60% correct answers.
Na ocenę 3.5	Student has sufficient knowledge in the required scope. He obtained between 61% -70% correct answers.
Na ocenę 4.0	Student has sufficient knowledge in the required scope. He obtained between 71% -80% correct answers.
Na ocenę 4.5	Student has sufficient knowledge in the required scope. He obtained between 81% -90% correct answers.
Na ocenę 5.0	Student has sufficient knowledge in the required scope. He obtained between 91% -100% correct answers.
Efekt kształcenia 4	
Na ocenę 2.0	Student has not sufficient knowledge in the required scope. He obtained less than 50% correct answers.
Na ocenę 3.0	Student has sufficient knowledge in the required scope. He obtained between 51% -60% correct answers.
Na ocenę 3.5	Student has sufficient knowledge in the required scope. He obtained between 61% -70% correct answers.
Na ocenę 4.0	Student has sufficient knowledge in the required scope. He obtained between 71% -80% correct answers.
Na ocenę 4.5	Student has sufficient knowledge in the required scope. He obtained between 81% -90% correct answers.
Na ocenę 5.0	Student has sufficient knowledge in the required scope. He obtained between 91% -100% correct answers.
Efekt kształcenia 5	

Na ocenę 2.0	Student has not sufficient knowledge in the required scope. He obtained less than 50% correct answers.
Na ocenę 3.0	Student has sufficient knowledge in the required scope. He obtained between 51% -60% correct answers.
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Na ocenę 5.0	Student has sufficient knowledge in the required scope. He obtained between 91% -100% correct answers.

10 Macierz realizacji przedmiotu

Efekt kształcenia	Odniesienie danego efektu do szczegółowych efektów zdefiniowanych dla programu	Cele przedmiotu	Treści programowe	Narzędzia dydaktyczne	Sposoby oceny
EK1		Cel 1 Cel 2	L1 L2 W1 W2 W3 W4 W5 W6	N1 N2 N3	F1 P1
EK3		Cel 3	L1 L2 L3 W2 W3 W4	N2 N3	F1 P1
EK4		Cel 2 Cel 3	W3 W4 W5 W6	N2 N3	F1 P1
EK5		Cel 1 Cel 2 Cel 3	W2 W3 W4 W5 C2 C3	N1 N2 N3	F1 P1

11 Wykaz literatury

12 Informacje o nauczycielach akademickich

Osoba odpowiedzialna za kartę

dr inż Tomasz Siuta (kontakt: tomasz.siuta@iigw.pk.edu.pl)

Osoby prowadzące przedmiot

1 dr inż. Tomasz Siuta (kontakt: tomasz.siuta@iigw.pk.edu.pl)

13 Zatwierdzenie karty przedmiotu do realizacji

(miejscowość, data) (odpowiedzialny za przedmiot) (dziekan)

Przyjmuję do realizacji (data i podpisy osób prowadzących przedmiot)

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