Politechnika Krakowska im. Tadeusza Kościuszki

Karta przedmiotu

obowiązuje studentów rozpoczynających studia w roku akademickim 2018/2019

Wydział Inżynierii Środowiska

Kierunek studiów: Inżynieria Środowiska — Profil: Ogólnoakademicki

Forma sudiów: stacjonarne — Kod kierunku: 2

Stopień studiów: I

Specjalności: Hydrotechnika i Geoinżynieria sem. zimowy 2017

1 Informacje o przedmiocie

Nazwa przedmiotu	Strength of materials
Nazwa przedmiotu w języku angielskim	Strength of materials
Kod przedmiotu	WIŚ IŚ oIS C18 18/19
Kategoria przedmiotu	Przedmioty kierunkowe
Liczba punktów ECTS	2.00
Semestry	5

2 Rodzaj zajęć, liczba godzin w planie studiów

Semestr	Wykład	Ćwiczenia	Laboratorium	Laboratorium komputerowe	Projekt	Seminarium
5	15	0	0	0	15	0

3 Cele przedmiotu

Cel 1 Introduction to the theory of stress and strain of deforming elastic bodies

Cel 2 Practical analysis of stress and strain state in bar/beam elements subject to uniaxial tension, compression (without buckling), 2D bending and 2D shear

4 Wymagania wstępne w zakresie wiedzy, umiejętności i innych kompetencji

1 Finalized course of mathematics and mechanics

5 Efekty kształcenia

EK1 Wiedza Student knows basic definitions of stress and strain state, Hooke's law, equation of static equilibrium, linearized Cauchy equations

EK2 Umiejętności Student is able to compute stress state for a given strain state or vice versa by using linear Hooke's law, is able to compute principal stress and their directions for 2D problems

EK3 Wiedza Student knows all nonzero stress/strain components that appear in the problem of uniaxial tension/compression and 2D bending and shear

EK4 Umiejętności Student is able to compute stress/strain components for problem of uniaxial tension/compression and bending including thermal effects

6 Treści programowe

Projekt		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
P1	Determing center of gravity for a symmetric and nonsymmetric cross sections, evaluating of moments of inertia, finding principal moments and directions	4
P2	Practical application of Hooke's law for one-dimensional, two-dimensional cases (plane stress and plane strain)	2
P3	Practical analysis of stress/strain state in staticaly determined or undetermined bar element subject to uniaxial tension/compression	3
P4	Practical analysis of stress/strain state in staticaly determined beams subject to bending	6

Wykład		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
W1	Geometrical characteristics of cross sections, definitions of static moment, center of gravity, moment of inertia, principal axes and moments of inertia	4
W2	Definition of stress matrix, sign convention, Navier equations of static equilibrium	2
W3	Theory of deformation, displacements, normal and shear strains, strain matrix and Cauchy equations	2
W4	Hooke's law, principle of superposition	2

Wykład		
Lp	Tematyka zajęć Opis szczegółowy bloków tematycznych	Liczba godzin
W5	Problem of unixial tension/compression	2
W6	Problem of pure bending, Bernoulli hypothesis, shear in 2D beams	3

7 Narzędzia dydaktyczne

N1 Ćwiczenia projektowe

N2 Wykłady

N3 Konsultacje

N4 Zadania tablicowe

8 Obciążenie pracą studenta

Forma aktywności	Średnia liczba godzin na zrealizowanie aktywności
Godziny kontaktowe z nauczycielem akademickim, w tym:	
Godziny wynikające z planu studiów	30
Egzaminy i zaliczenia w sesji	6
Godziny bez udziału nauczyciela akademickiego wynikające z nakładu pracy studenta	24
Sumaryczna liczba godzin dla przedmiotu wynikająca z całego nakładu pracy studenta	**60**
Sumaryczna liczba punktów ECTS dla przedmiotu	2

9 Sposoby oceny

Ocena formująca

F1 Projekt indywidualny

Ocena podsumowująca

P1 Kolokwium

Kryteria oceny

Efekt kształcenia 1	
Na ocenę 2.0	Student does not know theory of stress state or does not know theory of deformation (linearized theory) or does not know Hooke's law; in the final colloquium student achieved less than 51% of points from part concerned with this educational effect
Na ocenę 3.0	Student knows theory of stress state, theory of deformation (linearized) and Hooke's law; in the final colloquium student achieved 51-60% of points from part concerned with this educational effect
Na ocenę 3.5	In the final colloquium student achieved 61-70% of points from part concerned with this educational effect
Na ocenę 4.0	In the final colloquium student achieved 71-80% of points from part concerned with this educational effect
Na ocenę 4.5	In the final colloquium student achieved 81-93% of points from part concerned with this educational effect
Na ocenę 5.0	In the final colloquium student achieved 94-100% of points from part concerned with this educational effect
Efekt kształcenia 2	
Na ocenę 2.0	Student is unable to find a stress vector and its normal/tangent components for given stress matrix and given cross section plane; student is unable to compute stress components for given strain components using Hooke's law in plane stress/strain problems; student is unable to determine principal stress/strain directions; student does not comply with assumed deadlines for submission of the report concerning practical exercise on general stress/strain analysis; the report was evaluated on mark 2 in scale 2 to 5 or student achieved less than 51% points for answers concerning the report matter
Na ocenę 3.0	Student is able to find a stress vector and its normal/tangent components for given stress matrix and given cross section plane; student is able to compute stress components for given strain components using Hooke's law in plane stress/strain problems; student is able to determine principal stress/strain directions; student complies with assumed deadlines for submission of the report concerning practical exercise on general stress/strain analysis; the report was evaluated at least on mark 3 in scale 2 to 5 and student achieved 51-60% points for answers concerning the report matter
Na ocenę 3.5	The report was evaluated at least on mark 4 in scale 2 to 5 and student achieved 61-70% points for answers concerning the report matter
Na ocenę 4.0	The report was evaluated at least on mark 5 in scale 2 to 5 and student achieved 71-80% points for answers concerning the report matter
Na ocenę 4.5	The report was evaluated at least on mark 5 in scale 2 to 5 and student achieved 81-93% points for answers concerning the report matter
Na ocenę 5.0	The report was evaluated at least on mark 5 in scale 2 to 5 and student achieved 94-100% points for answers concerning the report matter
Efekt kształcenia 3	

Na ocenę 2.0	Student does not know nonzero elements in stress/strain tensors for problems of uniaxial tension/compression and bending coupled with shear; student does not know how to compute stresses in symmetric cross section subject to bending and shear (in 2D); in the final colloquium student achieved less than 51% of points from part concerned with this educational effect
Na ocenę 3.0	Student knows all nonzero elements in stress/strain tensors for problems of uniaxial tension/compression and bending coupled with shear; student knows how to compute stresses in symmetric cross section subject to bending and shear (in 2D); in the final colloquium student achieved 51-60% of points from part concerned with this educational effect
Na ocenę 3.5	In the final colloquium student achieved 61-70% of points from part concerned with this educational effect
Na ocenę 4.0	In the final colloquium student achieved 71-80% of points from part concerned with this educational effect
Na ocenę 4.5	In the final colloquium student achieved 81-93% of points from part concerned with this educational effect
Na ocenę 5.0	In the final colloquium student achieved 94-100% of points from part concerned with this educational effect
Efekt kształcenia 4	
Na ocenę 2.0	Student is unable to design a simple nonsymmetric I shape steel beam for given static scheme, loading, and strength value; student is unable to carry out stress analysis at certain points in predefined cross sections set along the beam axis; student does not comply with assumed deadlines for submission of the report concerning design of the beam; the report was evaluated on mark 2 in scale 2 to 5 or student achieved less than 51% points for answers concerning the report matter
Na ocenę 3.0	Student is able to design a simple nonsymmetric I shape steel beam for given static scheme, loading, and strength value; student is able to carry out stress analysis at certain points in predefined cross sections set along the beam axis; student complies with assumed deadlines for submission of the report concerning design of the beam; the report was evaluated at least on mark 3 in scale 2 to 5 and student achieved 51-60% points for answers concerning the report matter
Na ocenę 3.5	The report was evaluated at least on mark 4 in scale 2 to 5 and student achieved 61-70% points for answers concerning the report matter
Na ocenę 4.0	The report was evaluated at least on mark 5 in scale 2 to 5 and student achieved 71-80% points for answers concerning the report matter
Na ocenę 4.5	The report was evaluated at least on mark 5 in scale 2 to 5 and student achieved 81-93% points for answers concerning the report matter
Na ocenę 5.0	The report was evaluated at least on mark 5 in scale 2 to 5 and student achieved 94-100% points for answers concerning the report matter

10 Macierz realizacji przedmiotu

Efekt kształcenia	Odniesienie danego efektu do szczegółowych efektów zdefiniowanych dla programu	Cele przedmiotu	Treści programowe	Narzędzia dydaktyczne	Sposoby oceny
EK1	K_W12 K_U08	Cel 1	P2 W1 W2 W3 W4	N2	P1
EK2	K_W12 K_U08	Cel 1	W1 W2 W3 W4	N1 N3 N4	F1
EK3	K_W12 K_U08	Cel 2	P1 P3 P4 W5 W6	N2	P1
EK4	K_W12 K_U08	Cel 2	P1 P3 P4 W5 W6	N1 N3 N4	F1

11 Wykaz literatury

Literatura uzupełniająca

[1] Barry Dupen — *Applied Strength of Materials for Engineering Technology*, Purdue University, 2012, http://www.personal.ps

Literatura dodatkowa

[1] Comprehensive lecture notes in the pdf format delivered by the lecturer

12 Informacje o nauczycielach akademickich

Osoba odpowiedzialna za kartę

dr hab. inż., prof. PK Andrzej Truty (kontakt: andrzej.truty@gmail.com)

Osoby prowadzące przedmiot

1 dr hab. inż Andrzej Truty (kontakt: andrzej.truty@gmail.com)

2 dr inż. Krzysztof Podleś (kontakt: k_p@bci.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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