SYLLABUS

Name: ***Computer Methods in Theory of Structure (BudAB>SM3COMETS19)***
Name in Polish:
Name in English: ***Computer Methods in Theory of Structure***

Information on course:

Course offered by department: Faculty of Civil Engineering
Course for department: Silesian University of Technology
Term: Winter semester 2025/2026
Cordinator of course edition: Dr hab. inż. Tomasz Krykowski

Default type of course examination report:

EGZ

Language:

English

Course homepage:

https://platforma.polsl.pl/rb/course/view.php?id=1067

Short description:

The aim of the course is to familia students with the problems of nonlinear mechanics focused to numerical computation, algorithms, FEM.

Description:

Lecture: 10 hours
• Selected problems of geometrical nonlinearity (algorithms, computation etc).
• Selected problems of physical nonlinearity (algorithms, computation etc).
• Selected problems of buckling (algorithms, computation etc).
• Selected problems of dynamics (algorithm of direct integration: Newmark scheme, Hubolt scheme, etc.).
• Application in FEM software: ANSYS and/or ATENA.

Laboratory: 5 hours
Laboratory concern practical modeling of issues with the use of FEM software focused on nonlinear issues.

Project: 5 hours
Project concern solving nonlinear problems of mechanics using complex FEM software such as ANSYS, ATENA and software to matrix analysis Matlab.

Bibliography:

[1] KanchiMatrix M. B.: Methods of Structural Analysis, Wiley & Sons, Incorporated, John, 1994 r.
[2] Kouhia R.: Brief introduction to continuum mechanics, Lecture notes to the course: Mechanics of materials: http://www.tut.fi/rakmek/rak_32320/mat_mod_lecture_notes_2019_08_27.pdf.
[3] Oliver X., de Saracibar C. A.: Continuum Mechanics for Engineers. Theory and Problems, Second Edition, March 2017.
[4] Mase G., T., Mase G. E.: Continuum Mechanics for Engineers, CRC-Press, 1999, 3rd Edition.
[5] Felippa C. A.: Introduction to finite element methods, Department of Aerospace Engineering Sciences and Center for Aerospace Structures, University of Colorado, Boulder, Colorado 80309-0429, USA, Last updated Fall 2004
[6] Chen W. F., Han D. J.: Plasticity for Structural Engineers, Springer-Verlag 2011.
[7] Anandarajah A.: Computational methods in elasticity and plasticity, Springer-Verlag 2010.
[8] Jirasek M., Bazant Z.: Inelastic Analysis of Structures, Willey 2001.
[9] Wriggers P.: Nonlinear Finite Element Methods, Springer Berlin, Heidelberg, 2008.

Learning outcomes:

KNOWLADGE:
(1) The student knows and understands the method of formulating and solving problems of the theory of nonlinear structural mechanics (geometrically and physically along with time varying dynamical loads) - [learning outcome K2A_W04].
(2) The student knows the advances FEA - [learning outcome K2A_W05].

SKILLS:
(4) The student is able to analyze the problem of static and dynamic geometrical nonlinear problem - [learning outcome K2A_U04].
(5) The student is able to analyze the problem taking into account the physical nonlinearity of the material [learning outcome K2A_U05].
(3) The student knows how critically evaluate the results of numerical analysis of engineering structures - [learning outcome K2A_U06].

Assessment methods and assessment criteria:

Prerequisites: Pasing the subject Computer Methods in Theory of Structure.

In order to transfer partial grades, the student should contact the instructor within the first month of the semester.

The syllabus is valid from the winter semester of the 2025/2026 academic year, and its content is not subject to change during the semester.

Conditions for passing the course:
1) attendance at classes,
2) passing the colloquium including lectures,
3) prforming of 1 projects concerning analysis of dynamical problem of structural element taking into account physical and geometrical nonlinearity.

Final grade (depends on the number of points):
Colloquium 1-15 points + 1 x project (1-15 points):
30-28 points (5),
27-25 points (4.5),
24-22 points (4),

Information on course edition:

Default type of course examination report:
EGZ
Bibliography:
missing bibliography in English

Details of classes and study groups

lecture (10 hours)

Study groups details

Group number 1

Class instructors:
Dr hab. inż. Tomasz Krykowski

laboratory classes (5 hours)

Study groups details

Group number 1

Class instructors:
Dr hab. inż. Tomasz Krykowski

project (5 hours)

Study groups details

Group number 1

Class instructors:
Dr hab. inż. Tomasz Krykowski

Element of course groups in various terms:

Course group description	First term	Last term
missing group description in English (BudAB-S2-2019-sem3)	2020/2021-Z	

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	1	2020/2021-Z	

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Signature