

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

SUPERVISOR/TEAM/ DECLARING/CONDUCTING COURSE: Smolnicki Tadeusz.
DEPARTMENT: Mechanical Department
SCIENTIFIC DISCIPLINE: Mechanical Engineering

COURSE CARD

Course name in Polish: Metoda elementów skończonych
Course name in English: Finite Elemente Method
Course language Polish / ~~English~~*
University-wide general course type*:
The course is intended for all PhD students: YES / NO

- 1) **BASIC COURSE**
- 2) ~~**SPECIALIST COURSE**~~
- 3) ~~**SEMINAR**~~
- 4) ~~**HUMANISTIC COURSE**~~
- 5) ~~**LANGUAGE**~~

Subject code: MEQ100059W

* delete as applicable

| | Lecture | Foreign language course | Seminar | Mixed forms |
|--|-----------|-------------------------|-------------------|--------------------------------------|
| Number of hours of organized classes in university (ZZU) | 30 | | | |
| Grading | Exam | Exam | Oral presentation | Exam, inspection, evaluation classes |
| Number of ECTS points | 0 | | | |

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- 1. Mathematical analysis and matrix algebra
- 2. Basics of mechanics
- 3. Ability to solve systems of algebraic equations

COURSE OBJECTIVES

- C1. Acquiring knowledge of the basics of the theory of the finite element method
- C2. Acquiring the ability to define the appropriate model for FEM calculations.
- C3. Ability to interpret the results of numerical calculations

PROGRAM CONTENTS

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
TECHNOLOGY**

| Form of classes – lecture (Lec) | | Number of hours |
|--|--|------------------------|
| Lec1 | Introduction | 1 |
| Lec2 | Assumptions of the finite element method | 2 |
| Lec3 | Shape function | 3 |
| Lec4 | Stiffness matrix | 3 |
| Lec5 | Classification of finite elements | 2 |
| Lec6 | Plane element | 2 |
| Lec7 | Discretization rules | 2 |
| Lec8 | Types of analysis | 4 |
| Lec9 | Global stiffness matrix | 2 |
| Lec10 | Frames and trusses | 3 |
| Lec11 | Surface structures | 3 |
| Lec12 | Volumetric structures | 3 |
| Total hours: | | 30 |

| Form of classes – foreign language course (Lng) | | Number of hours |
|--|--|------------------------|
| Lng1 | | |
| Lng2 | | |
| Lng3 | | |
| .. | | |
| Total hours: | | |

| Form of classes – seminar (Sem) | | Number of hours |
|--|--|------------------------|
| Sem1 | | |
| Sem2 | | |
| Sem3 | | |
| ... | | |
| Total hours: | | |

| Form of classes – mixed forms (mix) | | Number of hours |
|--|--|------------------------|
| Mix1 | | |
| Mix2 | | |
| Mix3 | | |
| ... | | |
| Total hours | | |

| TEACHING TOOLS USED |
|--|
| N1. lecture with the use of multimedia presentations N2. problem discussion N3. analysis and interpretation of numerical calculations presented by the teacher |

| ACHIEVED SUBJECT LEARNING OUTCOMES | | |
|---|------------------|--------------------------------|
| Type of learning outcome | Code of learning | Assessment of learning outcome |
| | | |

**DOCTORAL SCHOOL OF WROCLAW UNIVERSITY OF SCIENCE AND
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| | outcome | |
|-------------------|---------|---|
| Knowledge | P8S_WG | Knowledge at an advanced level of FEM computer modelling and its impact on computational accuracy |
| Knowledge | P8S_WG | Knowledge at an advanced level of the theoretical fundamentals of the finite element method |
| ... | | |
| Skills | P8S_UW | Ability to choose the type of model, type of analysis and finite element selection to the problem |
| Skills | P8S_UW | Ability to select parameters of numerical analysis |
| ... | P8S_UW | Ability to interpret FEM analysis results |
| Social competence | | |
| Social competence | | |
| ... | | |

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

- [1] Rusinski E., Czmochoowski J., Smolnicki T.: Zaawansowana metoda elementów skończonych w konstrukcjach nośnych, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2000
- [2] Zienkiewicz O.C.: Metoda elementów skończonych, Arkady 1972

SECONDARY LITERATURE:

- [1] Rusiński E.: Zasady projektowania konstrukcji nośnych pojazdów samochodowych. Oficyna Wyd. PWr Wrocław 2002
- [2] Rakowski G., Kacprzyk Z.: Metoda elementów skończonych w mechanice konstrukcji, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2005
- [3] Szmelter J., Dacko M., Dobrociński S., Wieczorek M.: Metoda elementów skończonych w statyce konstrukcji, Arkady 1979
- [4] Gawroński W., Kruszewski J., Ostachowicz W., Tarnowski K., Wittbrodt E.: Metoda elementów skończonych w dynamice konstrukcji, Arkady, Warszawa 1984
- [5] Waszczyszyn Z., Cichoń Cz., Radwańska M.: Metoda elementów skończonych w stateczności konstrukcji, Arkady, Warszawa 1990
- [6] Kleiber M.: Wprowadzenie do metody elementów skończonych, PWN, Warszawa-Poznań 1989

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)

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