# STUDY MODULE DESCRIPTION FORM

| Name of the module/subject | | Code |
|---|---|---|
| **Numerical methods** | | **1010315311010340026** |
| Field of study: **Power Engineering** | Profile of study (general academic, practical): **(brak)** | Year /Semester: **1 / 1** |
| Elective path/specialty: **-** | Subject offered in: **polish** | Course (compulsory, elective): **obligatory** |
| Cycle of study: **Second-cycle studies** | Form of study (full-time,part-time): **part-time** | |
| No. of hours: Lecture: **15** Classes: **-** Laboratory: **15** Project/seminars: **-** | | No. of credits: **4** |
| Status of the course in the study program (Basic, major, other): **(brak)** | (university-wide, from another field): **(brak)** | |
| Education areas and fields of science and art: **technical sciences** | | ECTS distribution (number and %): **4 100%** |

## Responsible for subject / lecturer:

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## Prerequisites in terms of knowledge, skills and social competencies:

| | | |
|---|---|---|
| 1 | **Knowledge** | Student has extensive and in-depth knowledge of:<br>* Mathematics (range: linear algebra, matrix functions, calculus of functions of several variables, ordinary differential equations n-row, and initial boundary value problems)<br>* Computer Science (programming in high level language) |
| 2 | **Skills** | Students can solve math analytically within the range specified above.<br>Students can implement the algorithm in high-level programming language. |
| 3 | **Social competencies** | The student is aware of the need to broaden their competence.<br>Understands the need for learning.<br>The student is aware of the validity of the effects of engineering calculations |

## Assumptions and objectives of the course:

Knowledge of numerical methods and apply them to solve complex engineering problems in the energy field.
Power engineering calculations relevant tools.

## Study outcomes and reference to the educational results for a field of study

### Knowledge:

1. As a result of completion of this course the student will be able to: choose the approximate calculation methods and information technology applied to solve technical issues in the field of energy - [K_W01 ++ , K_W13 ++]
2. applied numerical methods used to solve engineering tasks - [K_W01 ++ , K_W13 ++]

### Skills:

1. As a result of completion of this course the student will be able to: - [K_U06 ++, K_U08 +++, K_U09 ++]
2. Use a commercial computer package in order to solve complex tasks by numerical methods - [K_U08 +++, K_U10 ++]
3. Perform measurements and tests computer technical tasks, interpret the results and draw conclusions - [K_U03 +, K_U03b +++]

### Social competencies:

1. student is aware of the validity of the effects of engineering calculations - [K_K01+, K_W02+]
2. student understands the need for learning throughout life - [K_K01+]

## Assessment methods of study outcomes

lectures:

- Assess the knowledge and skills demonstrated during the written examination of a problematic (student may use any teaching materials),
- Control of perception during lectures.

Laboratory:

- Test and favoring knowledge necessary to perform the tasks of laboratory
- Continuous evaluation for each course - rewarding gain skills they met the principles and methods
- Assessment of knowledge and skills related to the implementation of the tasks your practice, the assessment report performed exercise.

Get extra points for the activity in the classroom, and in particular for:

- Propose to discuss further aspects of the subject;
- The effectiveness of the application of the knowledge gained during solving the given problem;
- Comments related to the improvement of teaching materials;
- Developed aesthetic diligence reports and jobs - in the self-study.

## Course description

Floating point arithmetic, the numerical errors,
Numerical differentiation,
Issues boundary and initial
Numerical solution of ordinary differential equations n-row
Numerical solution of ordinary differential equations,
Some numerical methods for solving partial differential equations.

## Basic bibliography:

1. Burden, Faires ? Numerical analysis, Prindle, Weber&Schmidt, Boston,
2. Kincaid, Cheney, Analiza numeryczna, WNT 2005,
3. Kącki, Równania różniczkowe cząstkowe w zagadnieniach fizyki i techniki, WNT, Warszawa
4. Martin, Elementary differential Equations with boundary Value Problems, McGraw-Hill Book Company 1984

## Additional bibliography:

1. Kącki, Małolepszy, Romanowicz, Metody numeryczne dla inżynierów, Politechnika Łódzka 2000,
2. Fortuna, Macukow, Wąsowski, Metody numeryczne, WNT,

## Result of average student's workload

| Activity | Time (working hours) |
|---|---|
| | |

## Student's workload

| Source of workload | hours | ECTS |
|---|---|---|
| Total workload | 80 | 4 |
| Contact hours | 45 | 2 |
| Practical activities | 40 | 2 |