



## Subject card

|                                             |                                                                                                                                                                                                                                                             |                                                          |                                                                                                                                                                                                       |                                     |                                                                      |            |     |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Forecasting and Developmental Planning in Power Engineering, PG_00046002                                                                                                                                                                                    |                                                          |                                                                                                                                                                                                       |                                     |                                                                      |            |     |
| Field of study                              | Electrical Engineering                                                                                                                                                                                                                                      |                                                          |                                                                                                                                                                                                       |                                     |                                                                      |            |     |
| Date of commencement of studies             | February 2026                                                                                                                                                                                                                                               |                                                          | Academic year of realisation of subject                                                                                                                                                               |                                     | 2026/2027                                                            |            |     |
| Education level                             | second-cycle studies                                                                                                                                                                                                                                        |                                                          | Subject group                                                                                                                                                                                         |                                     |                                                                      |            |     |
| Mode of study                               | Full-time studies                                                                                                                                                                                                                                           |                                                          | Mode of delivery                                                                                                                                                                                      |                                     | at the university                                                    |            |     |
| Year of study                               | 1                                                                                                                                                                                                                                                           |                                                          | Language of instruction                                                                                                                                                                               |                                     | Polish                                                               |            |     |
| Semester of study                           | 2                                                                                                                                                                                                                                                           |                                                          | ECTS credits                                                                                                                                                                                          |                                     | 3.0                                                                  |            |     |
| Learning profile                            | general academic profile                                                                                                                                                                                                                                    |                                                          | Assessment form                                                                                                                                                                                       |                                     | exam                                                                 |            |     |
| Conducting unit                             | Department of Electrical Power Engineering -> Faculty of Electrical and Control Engineering -> Faculties of Gdańsk University of Technology                                                                                                                 |                                                          |                                                                                                                                                                                                       |                                     |                                                                      |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                          |                                                          | dr hab. inż. Paweł Bućko                                                                                                                                                                              |                                     |                                                                      |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                    |                                                          | dr hab. inż. Paweł Bućko                                                                                                                                                                              |                                     |                                                                      |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                 | Lecture                                                  | Tutorial                                                                                                                                                                                              | Laboratory                          | Project                                                              | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                       | 15.0                                                     | 15.0                                                                                                                                                                                                  | 0.0                                 | 0.0                                                                  | 0.0        | 30  |
|                                             | E-learning hours included: 0.0                                                                                                                                                                                                                              |                                                          |                                                                                                                                                                                                       |                                     |                                                                      |            |     |
| Learning activity and number of study hours | Learning activity                                                                                                                                                                                                                                           | Participation in didactic classes included in study plan |                                                                                                                                                                                                       | Participation in consultation hours |                                                                      | Self-study | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                       | 30                                                       |                                                                                                                                                                                                       | 6.0                                 |                                                                      | 39.0       | 75  |
| Subject objectives                          | Understanding the factors influencing the electricity demand. Understanding the basic methods of forecasting the demand in various time horizons. acquiring the ability to apply power forecasts in basic design and planning issues in the power industry. |                                                          |                                                                                                                                                                                                       |                                     |                                                                      |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                              |                                                          | Subject outcome                                                                                                                                                                                       |                                     | Method of verification                                               |            |     |
|                                             | [K7_U11] is able to analyse the variability of electricity loads, calculate power and energy losses, can carry out cost accounting                                                                                                                          |                                                          | is able to calculate energy purchase costs; knows the principles of creating pricing offers on the energy market                                                                                      |                                     | [SU1] Assessment of task fulfilment                                  |            |     |
|                                             | [K7_K05] can think and act creatively and entrepreneurially                                                                                                                                                                                                 |                                                          | able to create purchasing portfolios in the energy market; knows the principles of tariff settlements; knows the principles of wholesale settlements in the energy market and can use them creatively |                                     | [SK5] Assessment of ability to solve problems that arise in practice |            |     |

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| Subject contents                                               | Course content – lecture<br>Stochastic nature of the power loads variability. Basic factors influencing the course of the load in time. Division of energy forecasts according to the planning horizon. Basic applications of energy forecasting. Application of a simple extrapolation of past trends in a forecasting application. Econometric models used in forecasting. Methods of forecasting the daily load variability used in KDM. Methods of forecasting weekly and annual load variability used in KDM. Models of seasonal load variability. Component functions of the process. Static and dynamic variability. Forecasting the process of variability of power demand. Applications of multiple regression to forecasting in power engineering. Multiple correlation coefficient (R). Analysis of the influence of independent variables on the regression equation. Applications of neural networks for forecasting. Planning the level of power reserve in the system. Reserve concepts: spinning, hot, cool and cold. Statistical method used to determine electricity production plans by power plants and combined heat and power plants in individual months of the year. Planning of repairs. Classification of repairs of power units. Optimization of renovation periods for blocks. Factors affecting the duration of renovation for a selected block. Problems of forecasting the development of the production system. Taking the demand side into account in programming the development of the power industry. "Integrated System Development Planning". Formulating the problem of forecasting the development of a production system - optimization criterion. Calculation of energy generation costs for past block structures.Prześlij opinięHistoriaZapisaneSpołeczność |                                                                                                                                                                                     |                               |
|                                                                | Course content – exercises<br>Calculating forecasts using the classical annual variability method. Daily energy forecasting using the KDM method. Analysis of daily variability and its forecast in the Malko method. Monthly energy forecasting using the Malko-Trybuła method. Examples of applying linear regression in forecasting. Statistical inference in regression analyses.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                     |                               |
| Prerequisites and co-requisites                                | basic knowledge of energy management and economics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                     |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Passing threshold                                                                                                                                                                   | Percentage of the final grade |
|                                                                | exam                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 50.0%                                                                                                                                                                               | 100.0%                        |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1. Gładys H., Matla R.: Praca elektrowni w systemie elektroenergetycznym, WNT, Warszawa 1999.<br>2. Dobrzańska I. i inni: Prognozowanie w elektroenergetyce. PCz, Częstochowa 2007. |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1. Pr. zbiorowa : Analiza i prognoza obciążeń elektroenergetycznych, WNT, Warszawa 1971.                                                                                            |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                     |                               |
| Example issues/<br>example questions/<br>tasks being completed | forecasting the daily variability of electricity loads,forecasting the annual seasonality                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                     |                               |
| Practical activites within the subject                         | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                     |                               |

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