

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          |                                         |                                     |                        |            |     |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------|-------------------------------------|------------------------|------------|-----|
| Subject name and code                       | Modern Portfolio Theory with Digital Assets, PG_00208875                                                                                                                                                                                                                                                                                                                                                                            |                                                          |                                         |                                     |                        |            |     |
| Field of study                              | Finance and Accounting, Informatics and Econometrics, Management                                                                                                                                                                                                                                                                                                                                                                    |                                                          |                                         |                                     |                        |            |     |
| Date of commencement of studies             | October 2026                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                          | Academic year of realisation of subject |                                     | 2026/2027              |            |     |
| Education level                             | Master's studies                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          | Subject group                           |                                     | Optional subject group |            |     |
| Mode of study                               | full-time studies                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          | Mode of delivery                        |                                     | at the university      |            |     |
| Year of study                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          | Language of instruction                 |                                     | English<br>English     |            |     |
| Semester of study                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          | ECTS credits                            |                                     | 2.0                    |            |     |
| Learning profile                            | academic                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          | Assessment form                         |                                     | credit                 |            |     |
| Conducting unit                             |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          |                                         |                                     |                        |            |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                          | prof. dr hab. Paweł Miłobędzki          |                                     |                        |            |     |
|                                             | Teachers                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                          |                                         |                                     |                        |            |     |
| Lesson types                                | Lesson type                                                                                                                                                                                                                                                                                                                                                                                                                         | Lecture                                                  | Tutorial                                | Laboratory                          | Project                | Seminar    | SUM |
|                                             | Number of study hours                                                                                                                                                                                                                                                                                                                                                                                                               | 15.0                                                     | 0.0                                     | 0.0                                 | 0.0                    | 0.0        | 15  |
|                                             | E-learning hours included: 0.0                                                                                                                                                                                                                                                                                                                                                                                                      |                                                          |                                         |                                     |                        |            |     |
|                                             | Additional information:                                                                                                                                                                                                                                                                                                                                                                                                             |                                                          |                                         |                                     |                        |            |     |
|                                             | Lecture with multimedia presentation in a hybrid format.                                                                                                                                                                                                                                                                                                                                                                            |                                                          |                                         |                                     |                        |            |     |
| 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                                                                                                                                                                                                                                                                                                                                                                                                               | 15                                                       |                                         | 1.0                                 |                        | 34.0       | 50  |
| Subject objectives                          | Students will develop a practical understanding of how diversification, correlation, and risk-adjusted performance shape portfolio construction decisions. By combining financial theory with empirical market analysis, the lecture aims to strengthen students' ability to critically evaluate asset allocation decisions and assess whether emerging asset classes, such as cryptocurrencies, can improve investment portfolios. |                                                          |                                         |                                     |                        |            |     |

| Learning outcomes               | Course outcome                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Subject outcome                                                                                                                                                                                                                                             | Method of verification            |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
|                                 | [ZARZMU2_U07] Can create detailed written papers, including reviews, analyses, or research, along with presentations and oral discussions on management topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | The student is familiar with the mechanisms underlying digital cryptocurrency markets, including their regulation, and the methods used to analyse cryptocurrency price and volume dynamics. He/she can report on these issues either in writing or orally. | [SU4] test/exam - oral or written |
|                                 | [FiRMU2_U07] Can create detailed written papers, including reviews, analyses, or research papers, along with presentations and oral speeches on finance and accounting topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | The student is familiar with the mechanisms underlying digital cryptocurrency markets, including their regulation, and the methods used to analyse cryptocurrency price and volume dynamics. He/she can report on these issues either in writing or orally. | [SU4] test/exam - oral or written |
|                                 | [IiEMU2_U07] Can prepare detailed written papers, presentations, and oral speeches on econometrics, informatics, or statistics issues                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | The student is familiar with the mechanisms underlying digital cryptocurrency markets, including their regulation, and the methods used to analyse cryptocurrency price and volume dynamics. He/she can report on these issues either in writing or orally. | [SU4] test/exam - oral or written |
|                                 | [IiEMU2_W02] Comprehends advanced theoretical and practical concepts in econometrics, informatics, or statistics, which are essential for a deeper understanding of economic and social phenomena                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | The student is familiar with modern portfolio theory. He/she can construct a portfolio that includes digital assets and assess its performance.                                                                                                             | [SW4] test/exam - oral or written |
|                                 | [ZARZMU2_W02] Has an in-depth knowledge and understanding of various organizations, including their complexities, functional areas, internal processes, and their interactions with the environment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | The student is familiar with modern portfolio theory. He/she can construct a portfolio that includes digital assets and assess its performance.                                                                                                             | [SW4] test/exam - oral or written |
|                                 | [FiRMU2_W02] Possesses a comprehensive understanding of the complexities and functions of both domestic and international financial markets, as well as financial instruments and institutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | The student is familiar with modern portfolio theory. He/she can construct a portfolio that includes digital assets and assess its performance.                                                                                                             | [SW4] test/exam - oral or written |
| Subject contents                | <p>This lecture introduces Modern Portfolio Theory as the foundational framework for risk management through diversification in portfolio construction. We will discuss statistical measures of asset performance, including volatility and standard deviation, before introducing the Sharpe ratio, information ratio, and the derivation of the efficient frontier.</p> <p>This includes a discussion of the risk-free rate and its role in capital markets. To motivate portfolio construction principles, we examine asset correlations across full-sample periods and rolling windows to illustrate shifts in market regimes.</p> <p>These concepts are then applied to the outsized returns observed in cryptocurrencies, including practical considerations such as portfolio rebalancing and implementation across different investment horizons.</p> |                                                                                                                                                                                                                                                             |                                   |
| Prerequisites and co-requisites | Basic knowledge and skills in finance and statistics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                             |                                   |
| Assessment methods and criteria | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Passing threshold                                                                                                                                                                                                                                           | Percentage of the final grade     |
|                                 | Test comprising several multiple-choice questions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 51.0%                                                                                                                                                                                                                                                       | 100.0%                            |

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|----------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Recommended reading                                            | Basic literature         | <ul style="list-style-type: none"> <li>- Markowitz, H. (1952). <i>Portfolio Selection</i>. Journal of Finance, 7(1), 77–91.</li> <li>- Allen, F., Brealey, R., &amp; Myers, S. <i>Principles of Corporate Finance</i>. Latest edition. (Relevant chapters on portfolio theory, CAPM, diversification, and risk-adjusted returns.)</li> <li>- Baur, Hong, Lee (2018) Bitcoin: Medium of Exchange or Speculative Assets? <a href="https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2561183">https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2561183</a></li> </ul> |
|                                                                | Supplementary literature | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                                | eResources addresses     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Example issues/<br>example questions/<br>tasks being completed |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Work placement                                                 | Not applicable           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

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