



Subject card

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| Subject name and code | , PG_00055430 | | | | | | |
| Field of study | Mathematics | | | | | | |
| Date of commencement of studies | October 2022 | | Academic year of realisation of subject | | 2022/2023 | | |
| Education level | second-cycle studies | | Subject group | | Optional subject group Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | |
| Year of study | 1 | | Language of instruction | | Polish | | |
| Semester of study | 1 | | ECTS credits | | 5.0 | | |
| Learning profile | general academic profile | | Assessment form | | assessment | | |
| Conducting unit | Instytut Matematyki Stosowanej -> Faculty of Applied Physics and Mathematics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. Karol Dziedziul | | | | |
| | Teachers | | dr hab. Karol Dziedziul | | | | |
| | | | dr Wojciech Czernous | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 15.0 | 0.0 | 15.0 | 0.0 | 60 |
| | 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 | 60 | | 5.0 | | 60.0 | 125 |
| Subject objectives | Getting to know the models of the derivative market and mathematical modeling. | | | | | | |
| Learning outcomes | Course outcome | | Subject outcome | | Method of verification | | |
| | K7_U10 | | The student is able to correctly present the advanced methods of stochastic analysis. Can put emphasis on correct intuition | | [SU4] Assessment of ability to use methods and tools | | |
| | K7_W07 | | The student knows how to evaluate options in a discrete model using the Martingale method and using hedging. | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | K7_K04 | | Working on the first chapters of Hull allows for future job interviews to present the main ideas of financial mathematics in English. The student can speak about advanced methods of financial analysis. | | [SK4] Assessment of communication skills, including language correctness | | |
| | K7_U09 | | Stedent can be able to price of any non-standard option in the Black Schloes model | | [SU1] Assessment of task fulfilment | | |
| Subject contents | Discrete model: self-financing portfolio, arbitration. Equivalence theorem of local martingales, generalized martingales, martingales transformations. Theorem on the existence of a martingale measure for markets without arbitrage. Esher Lemma.Continuous models. Stochastic differential equations, Equations with affine coefficients solved exact. Numerical solutions. Standard Black Scholes model Heston model. Short-term rate models, Vasick's model. | | | | | | |
| Prerequisites and co-requisites | Probability theory. Measure theory | | | | | | |
| Assessment methods and criteria | Subject passing criteria | | Passing threshold | | Percentage of the final grade | | |
| | | | 60.0% | | 100.0% | | |

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| Recommended reading | Basic literature | <p>1. J. Jakubowski, A. Palczewski, M. Rutkowski, Ł. Stettner „Matematyka finansowa Wydawnictwo Naukowo-Techniczne 2003.</p> <p>2. J. Hull „Options, Futures, and the Other Derivatives Englewood Cliffs, Prentice-Hall 2007</p> <p>3. A.N. Shiryaev „Essentials of Stochastic Finance: Facts, Models, Theory Singapore, World Scientific 1999</p> |
| | Supplementary literature | .A. Brealey, S.C. Myers, Principles of Corporate finance McGraw Hill |
| | eResources addresses | <p>Adresy na platformie eNauczanie:</p> <p>Kontakty terminowe - Moodle ID: 26747</p> <p>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=26747</p> |
| Example issues/ example questions/ tasks being completed | Determine the value of a financial instrument $(S_T - K)^2$ | |
| Work placement | Not applicable | |