COURSE DESCRIPTION CARD - SYLLABUS

Course name
Software in FinTech [S2Inf1E-IO>OBF]

Course

Field of study
Computing

Year/Semester
1/2

Area of study (specialization)
Software Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
0

Other
0

Tutorials
0

Projects/seminars
30

Number of credit points

2,00

Coordinators

dr inż. Adam Wojciechowski
adam.wojciechowski@put.poznan.pl

Lecturers

Prerequisites

Learning outcomes from undergraduate studies. In addition, the student should have basic knowledge and skills in solving basic algorithmic problems, optimizing program code, obtaining information from given sources. The student should have the ability to build algorithms and programming. He or she should also understand the need to expand his or her skills and represent an open attitude to the diverse preferences and goals of capital market participants. In terms of social competence, the student must present such attitudes as honesty, responsibility, perseverance, cognitive curiosity, creativity, personal culture, respect for other people.

Course objective

The goal of the course is to provide students with selected knowledge in understanding modern financial instruments, performing financial transactions in an electronic environment, conducting the investment process and speculating in trading systems. Students will be provided with the knowledge of reading charts of quotations of investment instruments, understanding the nature of derivatives and the factors that affect price fluctuations. We will discuss the MQL language and present tools to facilitate the generation of automated trading strategies. In addition, blockchain technologies and their applications in the financial sector as well as other fields will be discussed. Rapid response to the volatility of quotations and instant execution of transactions is possible through the use of information systems and software that implements the functionality of a rule-based system or dynamically generates action scenarios using artificial intelligence techniques. The work component of the class will be to build software that allows automation of trading in contracts for difference in the form of a rule system that takes into account portfolio management, risk mitigation and profit maximization. The quality of the constructed system will be evaluated on the basis of multi-month tests performed on past data. The next stage will be statistical optimization as well as creative modification of the strategy algorithm. Tasks carried out within the framework of project classes can also be carried out in the direction of building a transaction system supporting a specific business plan based on collecting online payments, such as an online fundraising system, online store payments, etc.

Course-related learning outcomes

Knowledge:
the student has advanced detailed knowledge of selected issues in the application of computer science in finance. (k2st_w3)
the student has advanced knowledge of methods, techniques and tools used in solving complex engineering tasks and conducting research work in the selected area of online financial transactions. (k2st_w6)

Skills:
students are able to plan and conduct experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions, and formulate and verify hypotheses related to complex engineering problems and simple research problems. (k2st_u3)
students are able to use analytical, simulation and experimental methods to formulate and solve engineering tasks and simple research problems. (k2st_u4)
the student is able to prepare and present a scientific paper in english, presenting the results of scientific research or an oral presentation on detailed issues in the field of financial informatics. (k2st_u13)
the student is able to determine the directions of further learning and realize the process of self-education and suggest sources of knowledge for others. (k2st_u16)

Social competences:
the student understands that in computer science, knowledge and skills become obsolete very quickly. (k2st_k1)
the student understands the importance of using the latest knowledge in computer science in solving research and practical problems. (k2st_k2)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Formative assessment:
(a) for lectures:
On the basis of participation in the discussion and answers to questions on the material discussed in the lectures,
b) in terms of the project:
on the basis of evaluation of the current progress of the conceptual, implementation and optimization tasks.
Summative assessment:
(a) in terms of lectures, verification of the established learning outcomes is realized by:
evaluation of the knowledge and skills and innovation contained in the works carried out individually in project classes and in the form of homework. The presentation is generally oral, as the material

presented is usually available in the form of a history of transactions made on an investment demo account.
A test on knowledge of investment instruments, candlestick formations and technical analysis indicators is possible. The test will be used in case of low value (or reproducible nature) of the solutions developed during the project tasks.
b) in the scope of the project, verification of the established learning outcomes is carried out by:
* assessment of knowledge and skills related to the subject matter in the form of project tasks consisting of: * participation in a stock market game in demo mode, during which students demonstrate their understanding and ability to apply a number of investment techniques,
* evaluation and defense by students of a report (may be in the form of a presentation) on the implementation of the tasks of building an information system for conducting financial transactions, such as the implementation of investment strategies for selected financial instruments or oproramation to support a selected business plan.
* Assessment of the presentation of your own investment strategy.
Obtain additional points for activity during classes, especially for comments related to the improvement of teaching materials. Students can also additionally increase their grade by proposing interesting issues worth discussing during lectures or preparing a short presentation that develops or complements the proposed topic.

Programme content

The lecture program includes, among others, the following topics:
Applications of blockchain technology in the financial sector and other market segments.
Execution of financial transactions and payments from the level of websites and applications.
FOREX market, Derivatives: futures contracts, options
Technical analysis of stock quotes, candlestick formations
Elements of technical and fundamental analysis, relevant indicators, macroeconomic messages
Fibonacci proportions and their application in stock market quotation analysis and investment planning
Selected investment strategies, optimization of strategies
Investment strategy programming language MetaQuotes
Earning from knowledge: social trading, construction of automatic strategies, stock market competitions, etc.
Project classes are conducted in the form of stationary classes held in the laboratory or with the use of students" computers, preceded by a 2-hour instructional session at the beginning of the semester. During the exercises, with reference to the topics of the lectures held, there is a presentation of the MetaTrader trading platform and a discussion of the principles of conducting investments in the capital market. Students complete assignments individually during class and as part of homework consisting in an independent stock market game conducted on a demo account, in which the task is to multiply capital by opening and closing positions on the CFD market. In addition, students are given an assignment to optimize the investment strategies prepared by the instructor and to independently construct their own automatic forex trading strategy implemented in the MQL language. Alternatively, students implement software to help run a business in an online store or online collection, or any other form of activity requiring payment transactions.

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Teaching methods

Lecture: multimedia presentation, illustrated by examples given on the blackboard.
Project: use of trading systems, implemntation of strategies in MQL language, construction of a trading system.

Bibliography

Basic
1. Conor Svensson, Blockchain Innovator"s Handbook, Rethink Press, 2021
2. Thomas Bulkovski, Encyclopedia of chart patterns, Third Edition, Wiley
3. MQL4 Tutorial, https://book.mql4.com
4. Zenon Komar, Sztuka spekulacji po latach tom I i II, Wydawnictwo Linia, 2011
5. Adam Wojciechowski, An Approach to Trading Strategy Optimization by Perfect Timing, Proceedings of 7th Language and Technology Conference, Z.Vetulani, J.Mariani (eds.), Human Language Technologies as a Challenge for Computer Science and Linguistics, Nov. 27-29, 2015, Poznan, pp.413-417.
Additional
1. Mark Galant, Brian Dolan, FOREX dla bystrzaków, Wydawnictwo Helion 2012
2. Joe DiNapoli, Poziomy DiNapolego. Praktyczne zastosowanie analizy Fibonacciego na rynkach inwestycyjnych, Wydawnictwo WIG-Press 2004

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	45	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	5	0,50