COURSE DESCRIPTION CARD

NOTE: If the course includes lectures and classes, the Course Description Card applies to both types of instruction.

1. Course title:
in Polish / in English
Analiza szergów czasowych / Time Series Analysis

2. Course code:
Number of ECTS credits: 3,0
Course completion mode: E
Course commenced / Year 2019/20

3. Major: Finance and Accounting

4. Department of major coordinator: dr hab. Grażyna Szustak, prof. UE, Department of Banking and Financial Markets

5. Name of course instructor: Lecture: dr Stanisław Barczak
Examiner dr Stanisław Barczak

6. Department of course instructor: Department of Applied Mathematics

7. Number of contact hours with students:

Type of instruction	Full-time study	Part-time study
lectures	30	-
classes	-	-
foreign language classes	-	-
lab classes	-	-
seminars	-	-
e-learning	-	-
other	-	-
Total hours	30	0
examination (hours)	2	-

8. Course timeframe - no. of semesters: 1

Course commencement / Year 2

Course commencement / Semester 1

9. Level of tertiary education: Master Degree

10. Course status
☐
Compulsory for the specialization:
ARIMA
☐

11. Course prerequisites
Compulsory: MATHEMATICS, STATISTICS
Recommended: ECONOMETRICS, FINANCIAL ECONOMETRICS

12. Course objectives:

1. Transfer of knowledge and skills in the field of econometric theory and practical applications of modeling financial time series: random walk process, AR process (p), MA process (q), ARMA process (p, q), ARIMA process (p, d, q), models of variation: ARCH, GARCH, selected models of multidimensional time series
2. Developing skills in the theory and practice of modeling multidimensional financial time series: vector autoregression, vector process of moving average, vector ARMA model
3. Education of social competence in the field of development and application the above analytical methods.

13. Teaching and learning methods:

A. Direct student-instructor contact:

No.	Teaching methods	Description	Number of hours	
			Full-time study	Part-time study
1.	Active lecture	Presentation and discussion on selected issues of financial time series modeling	15	0
2.	Lecture using multimedia techniques	Presentation of theoretical and practical issues in modeling time series with particular emphasis on financial time series.	15	0
Total			AS: 30	AN: 0

B. Self-study:

No.	Learning methods	Description	Number of hours	
			Full-time study	Part-time study
1.	Analysis of lecture notes	Getting to know the content of the subject presented during the lecture.	20	0
2.	Analysis of source materials	Acquaintance with selected issues through literature studies.	15	0
3.	Independent work using a computer	The use of computer software to analyze time series.	10	0
Total			BS: 45	BN: 0

Total AS+BS = 75
Examination (E) = 2
Total AS+BS+E= 77

Total AN+BN = 0
Examination (E) = 0
Total AN+BN+E = 0

14. Key words: econometrics, dynamic econometrics, time series

15. Course content:

1. The concept of time series and its characteristics.
2. Stationary concept.
3. ACF and PACF functions. Significance testing.
4. AR (p), MA (q), ARMA (p, q) processes: identification, estimation, forecasts.
5. Integrated processes. Testing the order of integration.

6. Integrated processes: ARI (p, d), ARIMA (p, d, q): identification, estimation, forecasts.
7. Models of conditional variance: ARCH, GARCH.
8. Multidimensional models of time series: the VAR vector model.

16. Course learning outcomes as related to the learning outcomes of the major and methods for assessing student attainment

Intended learning outcomes of the major / Symbols	Intended learning outcomes of the course	Methods for assessing student learning outcomes	Documentation
	Knowledge		
FiR2_W01#	The student knows and understands in depth the processes and phenomena occurring over time, with particular emphasis on financial markets.	Written exam	1. List of exam issues 2. Written work of students
FiR2_W02#	The student knows and understands in depth the methods in the field of time series analysis.	Written exam	1. List of exam issues 2. Written work of students
	Skills		
FiR2_U01#	The student is able to use the acquired in-depth knowledge of process identification, critical analysis through the prism of time series theory.	Written exam	1. List of exam issues 2. Written work of students
FiR2_U04#	The student is able to use a foreign language at B2 + level.		
	Social competences		
FiR2_K01#	The student is able to independently develop their competences in the field of time series analysis.	Written exam	1. List of exam issues 2. Written work of students

17. Method for determining the final course grade:

No.	Methods for awarding credits and course completion requirements	Description	Percentage of the final course grade*
1.	Written exam without the possibility of using textbooks	Questions in the field of time series analysis resulting from the course content of the subject.	100%

* If students are required to obtain both a class grade and an exam grade, the class grade constitutes at least 30% of the final course grade.

18. Reading list

Mandatory readings:

1. R. S. Tsay: Analysis of Financial Time Series, Jo0hn Wiley & Sons 2010
2. G.S. Maddala: Ekonometria. Wydawnictwo Naukowe PWN Warszawa 2006.
3. M. Osińska: Ekonometria finansowa . Wyd. PWE, Warszawa , 2006.

4. M. Piłatowska: Modelowanie niestacjonarnych procesów ekonomicznych-studium metodologiczne, wydawnictwo UMK, Toruń, 2003.

Suggested readings:

1.Kufel T: Ekonometria. Rozwiązywanie problemów z wykorzystaniem programu GRETL. Wydawnictwo.

2.M. Osińska: Ekonometria współczesna. Wyd. Dom organizatora, Toruń, 2007

19. Language of instruction:
English

20. Course instructors' recommendations:

Software: MS Excel, Gretl