Zagadnienia odpowiadają programom studiów I stopnia z r.ak. 2020/21 oraz programom studiów II stopnia z r.ak. 2021/22 bo te roczniki bronią się wg planu w r.ak. 2022/23.
Please note that the topics correspond to AY 2020/21 1st cycle study programmes and AY 2021/22 2nd cycle study programmes since according to the study plan these students will be defending their theses in AY 2022/23.

115

Stopień / Cycle	Jęz. / Lang.	Przedmiot / Course	Zagadnienia / Topics	DSBA
II	ENG	Applied Microeconomics	Experimental methods in economics	x
II	ENG	Applied Microeconomics	Risk and uncertainty	x
II	ENG	Applied Microeconomics	Time in economics (time value of money and ergodicity of economic processes)	x
II	ENG	Applied Microeconomics	Market mechanism and its testing methods	x
II	ENG	Applied Macroeconomics	Equilibrium conditions in a static general equilibrium model	x
II	ENG	Applied Macroeconomics	Dynamic general equilibrium: Solow Model	x
II	ENG	Applied Macroeconomics	Dynamic stochastic general equilibrium: Real Business Cycles (RBC) model	x
II	ENG	Applied Macroeconomics	Dynamic stochastic general equilibrium: New Keynesian model	x
II	ENG	Advanced Econometrics	Binary dependent variable models.	x
II	ENG	Advanced Econometrics	Models for unordered choice analysis.	x
II	ENG	Advanced Econometrics	Methods for ordered choice analysis.	x
II	ENG	Advanced Econometrics	Panel data modelling	x
II	ENG	Advanced Econometrics	Methods of modelling with censored dependent variable	x
II	ENG	Advanced Econometrics	Methods of count data modelling	x
II	ENG	Advanced Econometrics	Stationarity and non-stationarity in Time Series Modelling.	x
II	ENG	Advanced Econometrics	Time series modelling (ARIMA, (AR)DL and extentions)	x
II	ENG	Advanced Econometrics	Methods and criteria of econometric models selection	x
II	ENG	Applied Finance	Value-at-Risk: definition, models, testing	x
II	ENG	Applied Finance	Path dependent option pricing	x
II	ENG	Applied Finance	Statistical tools in algorithmic trading	x
II	ENG	Applied Finance	Credit risk modelling - scoring cards and expected loss	x
II	ENG	R intro	Types of objects in R	x
II	ENG	R intro	Importance of clean code writing and error testing	x
II	ENG	R intro	Specificies of open sourse software - relation between base R and packages	x
II	ENG	R intro	Role of vectors in R	x
II	ENG	R intro	Processing of long vs wide data - transformations and usage	x
II	ENG	R intro	Typical data manipulation and cleaning techniques	x
II	ENG	Python and SQL	Basic data structures in Python.	x
II	ENG	Python and SQL	Relational database management systems	x
II	ENG	Python and SQL	Functions and Objects in Python programming	x
II	ENG	Python and SQL	Data science libraries in Python	x
II	ENG	Python and SQL	Types of tables joining in SQL	x
II	ENG	Python and SQL	Role of indexing in SQL	x
II	ENG	Algorithms for Data Science	Asympotitc notation: simplification and comparison of given running time functions	x
II	ENG	Algorithms for Data Science	Running time analysis and application of the Master Theorem	x
II	ENG	Algorithms for Data Science	Recursion with memoization and comparison to dynamic programming	x
II	ENG	Algorithms for Data Science	Properties and use cases of classic search and sorting algorithms (binary search, linear search, insertion sort, merge sort, heap sort, counting sort)	x
II	ENG	Algorithms for Data Science	Properties and use cases of important data structures (array indexed by keys implementing a dictionary, AVL tree, hash table, heap, stack, queue)	x
II	ENG	Algorithms for Data Science	Graph algorithms (Breadth-First Search, Dijkstra's algorithm, Kruskal's algorithm)	x
II	ENG	Statistics and Explanatory Data Analysis	Role of Explanatory Data Analysis in modelling process	x
II	ENG	Statistics and Explanatory Data Analysis	Data visualization methods depending on variable type and purpose of visualization	x
II	ENG	Statistics and Explanatory Data Analysis	Typical challenges with data and methods of data adjustments	x

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II	ENG	Statistics and Explanatory Data Analysis	Properties of (differences between) central location measures in statistical testing	x
II	ENG	Statistics and Explanatory Data Analysis	Association measures (Correlation and alternatives for different type of data)	x
II	ENG	Statistics and Explanatory Data Analysis	Normality assumption and central limit theorem in statistical testing	x
II	ENG	Statistics and Explanatory Data Analysis	Nominal data testing	x
II	ENG	Statistics and Explanatory Data Analysis	Methods of two sample testing	x
II	ENG	Statistics and Explanatory Data Analysis	ANOVA testing and its alternatives	x
II	ENG	Introduction to Data Science	Importance of soft skills in data science.	x
II	ENG	Introduction to Data Science	Applications of datascience.	x
II	ENG	Introduction to Data Science	Different types of machine learning.	x
II	ENG	Unsupervised Learning	Different concepts of distance measurement (e.g. for quantitative, qualitative, binary data)	x
II	ENG	Unsupervised Learning	Clustering with k-means, CLARA, PAM and hierarchical approach	x
II	ENG	Unsupervised Learning	Clustering based on density (e.g. DBSCAN)	x
II	ENG	Unsupervised Learning	Clustering quality measures	x
II	ENG	Unsupervised Learning	Dimensionality reduction with distance-based algorithms (e.g. MDS)	x
II	ENG	Unsupervised Learning	Dimensionality reduction with variance-based algorithms (e.g. PCA)	x
II	ENG	Unsupervised Learning	Association rules to find co-occurence of features	x
II	ENG	Unsupervised Learning	Schemes of cutting variables into intervals in the context of association rules	x
II	ENG	Webscraping and Social Media Scraping	Various types of bots	x
II	ENG	Webscraping and Social Media Scraping	Tools used for web scraping	x
II	ENG	Webscraping and Social Media Scraping	Efficiency of web scraping tools	x
II	ENG	Webscraping and Social Media Scraping	Regulatory restrictions on web scraping	x
II	ENG	Webscraping and Social Media Scraping	Responsible and polite web scraping	x
II	ENG	Webscraping and Social Media Scraping	XML, HTML, tags	x
II	ENG	Advanced Programming in R	Types of programming available in R	x
II	ENG	Advanced Programming in R	Object-oriented programming paradigm	x
II	ENG	Advanced Programming in R	Efficiency of vectorised vs loop-based code in R	x
II	ENG	Advanced Programming in R	Importance and types of defensive programming techniques	x
II	ENG	Advanced Programming in R	Role of tidyverse for data processing in R	x
II	ENG	Advanced Programming in R	Main concepts behind Shiny application	x
II	ENG	Advanced Programming in R	Reactive programming concept in Shiny	x
II	ENG	Advanced Programming in R	User defined functions in R - creating and testing	x
II	ENG	Advanced Visualisation in R	Visualistation techniques for categorical variables	x
II	ENG	Advanced Visualisation in R	Visualistation techniques for continuous variables	x
II	ENG	Advanced Visualisation in R	Visualistation techniques for 1D distribution	x
II	ENG	Advanced Visualisation in R	Visualistation techniques for 2D distribution	x
II	ENG	Advanced Visualisation in R	Visualisation techniques for Machine Learning Classification models	x
II	ENG	Advanced Visualisation in R	Role of ggplot2 package for data visualisation in R	x
II	ENG	Machine Learning I	Feature selection methods	x
II	ENG	Machine Learning I	Machine learning algorithms vs traditional econometric models	x
II	ENG	Machine Learning I	Cost function, evaluation metrics for regression and classification	x
II	ENG	Machine Learning I	Cross-validation, aim and methods	x
II	ENG	Machine Learning I	K-nearest neighbours algorithm	x
II	ENG	Machine Learning I	Support Vector Machine and Support Vector Regression	x
II	ENG	Machine Learning I	Regularization methods: ridge, LASSO, elastic net	x
II	ENG	Machine Learning I	Feature engineering	x

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II	ENG	Machine Learning I	Rebalancing methods	x
II	ENG	Machine Learning II	Metrics to evaluate regression and classification models	x
II	ENG	Machine Learning II	The structure of decision tree and its mechanism	x
II	ENG	Machine Learning II	Advantages and disadvantages of decision trees	x
II	ENG	Machine Learning II	Differences between bagging and boosting techniques	x
II	ENG	Machine Learning II	Application of gradient descent concept in machine learning algorithms	x
II	ENG	Machine Learning II	Types of ensemble learning	x
II	ENG	Machine Learning II	Difference between Gradient boosting and XGboosting	x
II	ENG	Machine Learning II	Elements of neural network and its mechanisms	x
II	ENG	Machine Learning II	Applications of neural networks and their specificities	x
II	ENG	Text Mining and Social Media Mining	Text preprocessing	x
II	ENG	Text Mining and Social Media Mining	Regular expressions	x
II	ENG	Text Mining and Social Media Mining	Text categorization	x
II	ENG	Text Mining and Social Media Mining	Text clustering	x
II	ENG	Text Mining and Social Media Mining	Topic modeling	x
II	ENG	Text Mining and Social Media Mining	Sentiment analysis	x
II	ENG	Text Mining and Social Media Mining	Information diffusion in social networks	x
II	ENG	Text Mining and Social Media Mining	Word embeddings	x
II	ENG	Text Mining and Social Media Mining	Neural networks in text mining	x
II	ENG	Big Data Analytics	Columnar storage - concept, examples, use cases	x
II	ENG	Big Data Analytics	MapReduce - concept, examples, use cases	x
II	ENG	Big Data Analytics	Fault tolerance & high availability in Big Data - definition, considerations	x
II	ENG	Reproducible Research	Code documentation and clean coding	x
II	ENG	Reproducible Research	Version control systems and collaboration	x
II	ENG	Reproducible Research	Generative AI and reproducibility issues	x
II	ENG	Reproducible Research	Reproducible environments - problems and solutions	x
II	ENG	Reproducible Research	Common problems with reproducibility and replication	x
II	ENG	Reproducible Research	Cloud computing	x