

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details						
Code				Academic Year		Semester
EBT327				4		7
Title				T	A	L
Statistical Methods of Data Analysis				2	2	1
				6		
Language		German				
Level	Undergraduate	X	Graduate		Postgraduate	
Department / Program		Energy Science and Technology				
Forms of Teaching and Learning		Face-to-face				
Course Type	Compulsory			Elective	X	
Objectives	This course aims to equip students with the ability to design and conduct data surveys in technical work environments in accordance with statistical principles, analyze the collected data, and, based on the obtained findings, reinforce their competence in problem identification and the development of sustainable solutions through fundamental methods applicable to business practices.					
Content	The course content covers fundamental statistical concepts and terminology; data types and measurement levels; sampling and sampling errors; descriptive statistics; probability and distributions; inferential statistics (confidence intervals, hypothesis testing); correlation and regression; and basic multivariate approaches. It also includes data acquisition, cleaning, visualization, and analysis workflows using R/Python/SPSS, along with reporting and reproducibility practices, and principles of data ethics and privacy.					
Prerequisites	None					
Coordinator	Dr. Lucie Kretzler					
Lecturer(s)	Dr. Lucie Kretzler					
Assistant(s)						
Work Placement						
Recommended or Required Reading						
Books / Lecture Notes	-					
Other Sources	Statistische Methoden der Datenanalyse https://www-zeuthen.desy.de/~kolanosk/smd_ss08/skripte/skript.pdf Sachs, L. (2004): Angewandte Statistik, 11.Auflage, Springer, Berlin. Sachs L., Hedderich J. (2006): Angewandte Statistik. Methodensammlung mit R., Springer Hatzinger, R., Hornik, K., Nagel, H. Maier, M.J. (2014): R: Einführung durch angewandte Statistik, 2. Auflage, Pearson. Fahrmeir, L., Künstler, R., Pigeot I., Tutz, G. (2016): Statistik: Der Weg zur Datenanalyse, 8. Auflage, Springer Feindt, M. Kerzel, U. (2015): Prognosen bewerten: Statistische Grundlagen und praktische Tipps, Springer Gabler Und viele online Quellen dazu.					

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Additional Course Material	
Documents	-
Assignments	-
Exams	1 Midterm, 1 Final

Course Composition		
Mathematics und Basic Sciences	60	%
Engineering	40	%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		%

Assessment		
Activity	Count	Percentage (%)
Midterm Exam	1	30
Quiz		
Assignments		
Attendance		
Recitations		
Projects	1	30
Final Exam	1	40
Total		100

ECTS Points and Work Load			
Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	10	6	60
Assignments	2	7	14
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	2	24
Laboratory	14	1	14
Projects	12	2	24
Final Exam	1	2	2
Total Work Load			168

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ECTS Points (Total Work Load / Hour)	6
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Learning Outcomes

1	Fundamentals of Statistics, Data Collection Methods, Data Analysis
2	Data Analysis Using Excel Spreadsheet, SPSS, and R
3	Bayes' Theorem; Multivariate Analysis; ANOVA (Analysis of Variance); Principal Component Analysis (PCA); Econometric Methods

Weekly Content

1	What is Statistics? Types of statistics, fundamental prerequisites of statistics
2	Foundations of Bayesian Statistics
3	Introduction to Multiple Linear Regression: model formulation and regression equation
4	Evaluating the Quality of Regression Models: multicollinearity, residual analysis, model selection
5	Logistic Regression; Multivariate Analyses; limitations and common sources of error in regression
6	One-Way ANOVA (Analysis of Variance): principles and mathematical derivation
7	Two-Factor ANOVA; Analysis of Covariance (ANCOVA)
8	Midterm Exam
9	Fundamentals of Principal Component Analysis (PCA)
10	PCA; in-depth interpretation of principal components
11	Econometric Approaches in Energy Research – Part 1
12	Econometric Approaches in Energy Research – Part 2
13	Econometric Approaches in Energy Research – Part 3
14	Combining Methods, presentation of real case studies, strategies for model selection, and result validation.
15	Project Presentations
16	Final Exam

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7	P8	P9
O1	5		4	4			5		2
O2	5		4	4			5		2
Ö3	5		4	4			5		2

Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

Compiled by: Res. Asist. Kevser Celep

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