

**1. Data about the program**

1.1 Higher education institution	Babeş-Bolyai University
1.2 Faculty	Faculty of Engineering
1.3 Doctoral school	Doctoral School of Engineering
1.4 Field of study	Mechanical Engineering
1.5 Study cycle	Doctorate
1.6 Study program / Qualification	Doctoral training / PhD in Mechanical engineering

**2. Course data**

2.1 Name of discipline	<b>Research methodology and statistical data processing</b>						
2.2 Teacher responsible for lectures	<b>Prof. univ. dr. ing. Gilbert-Rainer GILLICH</b>						
2.3 Teacher responsible for seminars	<b>Prof. univ. dr. ing. Gilbert-Rainer GILLICH</b>						
2.4 Year of study	<b>1</b>	2.5 Semester	<b>1</b>	2.6. Type of evaluation	<b>C.</b>	2.7 Course framework	<b>Obl</b>

**3. Estimated total time of teaching activities (hours per semester)**

3.1 Hours per week	3	Out of which: 3.2 Lectures	1	3.3 Seminars / Laboratory	2
3.4 Total hours in the curriculum	36	Out of which: 3.5 Lectures	12	3.6 Seminars / Laboratory	24
Allocation of study time:					
Textbook supported study, other course materials, recommended bibliography and personal notes					<b>40</b>
Additional learning activities in the library, on specialized online platforms and in the field					<b>52</b>
Preparation of seminars / laboratory classes, topics, papers, portfolios and essays					<b>120</b>
Tutoring					-
Examinations					<b>2</b>
Other activities: -					-
3.7 Individual study (total hours)	<b>214</b>				
3.8 Total hours per semester	<b>250</b>				
3.9 Number of credits	<b>10</b>				

**4. Preconditions (where applicable)**

4.1 Curriculum	•
4.2 Competences	•

**5. Conditions (where applicable)**

5.1 Conducting lectures	• Video projector, PC, blackboard, chalk
5.2 Conducting seminars / laboratory classes	•

**6. Specific competences acquired**

<b>Professional competences</b>	<ul style="list-style-type: none"> <li>• Designing scientific experiments in order to deduce / demonstrate some physical rules or laws</li> <li>• Choosing the appropriate methods for analyzing and interpreting measurement data</li> <li>• Use of computer technology and physical equipment in the acquisition and processing of data</li> <li>• Development and implementation of complex physical or numerical systems for testing and experimentation</li> <li>• Preparation of scientific reports and presentations</li> </ul>
<b>Transversal competences</b>	<ul style="list-style-type: none"> <li>• Assumption of responsibility and responsible fulfillment of tasks</li> <li>• Formulation of conclusions based on analytical, numerical and / or experimental results</li> </ul>

## 7. Course objectives (based on the acquired competencies grid)

7.1 The general objective of the course	<ul style="list-style-type: none"> <li>• Training of skills and abilities in the field of experimental research</li> </ul>
7.2 Specific objectives	<ul style="list-style-type: none"> <li>• Training the ability to choose or design technical-scientific experiments</li> <li>• Training of data processing capacity</li> <li>• Training the ability to interpret the results of measurements</li> </ul>

## 8. Content

8.1 Lectures	Teaching methods	Comments
Fundamentals of experimental research methods and techniques. Research definition. Specific types of research.	Presentation, discussion, case studies, exercises	2 hours
Choosing the research topic. Formulation of hypotheses. Scientific documentation.		2 hours
Development of a research program. Planning and conducting experiments.		2 hours
Data collection and acquisition. Analog-discrete conversion. Sampling.		2 hours
Statistical data processing. Determining the interdependencies between parameters. Regression curves. Statistical and similarity tests.		2 hours
Graphical representation of data. Visualization and interpretation of experimental data.		2 hours
Bibliography: <a href="http://www.ru.ac.bd/wp-content/uploads/sites/25/2019/03/102_10_Longnecker_An-Introduction-to-Statistical-Methods-and-Data-Analysis-6th-Ed.pdf">http://www.ru.ac.bd/wp-content/uploads/sites/25/2019/03/102_10_Longnecker_An-Introduction-to-Statistical-Methods-and-Data-Analysis-6th-Ed.pdf</a>		
8.2 Seminars / laboratory classes	Teaching methods	Comments
Case studies prepared with the doctoral students, based on their individual doctoral research topics	Presentation, discussion, exercises	24 hours
Bibliography: <a href="https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Rand_R._Wilcox_Fundamentals_of_Modern_StatisticaBookZZ.org_.pdf">https://fmipa.umri.ac.id/wp-content/uploads/2016/03/Rand_R._Wilcox_Fundamentals_of_Modern_StatisticaBookZZ.org_.pdf</a>		

## 9. Aligning the contents of the discipline with the expectations of the epistemic community representatives, professional associations and standard employers operating in the program field

- Building skills and abilities related to research methodology and statistical data processing

## 10. Examination (by request)

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Lectures	Active presence and participation	Heuristic conversation	20%
10.5 Seminars / laboratory classes	Preparing a portfolio of practical applications focusing on the issues discussed in the course and practical applications	Defence of application portfolios	80%
10.6 Minimum performance standard			
<ul style="list-style-type: none"> <li>• Drafting and defending the portfolio of practical applications</li> <li>• Attendance of lectures and seminars</li> </ul>			

Date of issue      Signature of the teacher responsible for lectures  
 October 2022      **Prof. univ. dr. ing. Gilbert-Rainer GILLICH**

Signature of the teacher responsible for seminars  
**Prof. univ. dr. ing. Gilbert-Rainer GILLICH**

Signature of the doctoral school director  
**Conf. univ. dr. ing. abil. Zoltan-Iosif KORKA**