

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	Advanced vibrodiagnostics in mechanical engineering						
2.2 Teacher responsible for lectures	Conf. univ. dr. ing. abil. Zoltan-Iosif KORKA						
2.3 Teacher responsible for seminars	Conf. univ. dr. ing. abil. Zoltan-Iosif KORKA						
2.4 Year of study	1	2.5 Semester	1	2.6. Type of evaluation	E	2.7 Course framework	Opt

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					46
Additional learning activities in the library, on specialized online platforms and in the field					32
Preparation of seminars / laboratory classes, topics, papers, portfolios and essays					120
Tutoring					-
Examinations					2
Other activities: -					-
3.7 Individual study (total hours)	214				
3.8 Total hours per semester	250				
3.9 Number of credits	10				

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

Professional competences	<p>C1. Application of techniques and methods for experimental investigation of mechanical systems. C2. Diagnose of mechanical systems and ensure their maintenance.</p>
Transversal competences	<p>CT1. Written and oral communication skills in science. CT2. Use of information and communication technology. CT3. Interpersonal, teamwork and management skills.</p>

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

7.1 The general objective of the course	• Learning advanced vibrodiagnostics used in mechanical engineering
7.2 Specific objectives	• Acquire theoretical and practical knowledge of vibrodiagnostics of the main systems in mechanical engineering

8. Content

8.1 Lectures	Teaching methods	Comments
Lecture 1 Introduction 1.1 Vibration sources 1.2 Mechanical vibration propagation 1.3 Frequency response of mechanical systems 1.4 Response of multi-degree-of-freedom systems	Interactive lecture, explanation, conversation, problem-solving	2 hours
Lecture 2 Vibrodiagnostic apparatus and techniques 2.1 General schemes 2.2 Choice of apparatus for vibration measurement 2.3 Placement of vibration measuring apparatus		2 hours
Lecture 3 Vibrodiagnostic methods 3.1 Time diagnosis methods 3.2 Frequency domain diagnostic methods 3.3 Cepstrum analysis 3.4 Time and frequency analysis		2 hours
Lecture 4 Vibrodiagnosis of bearings 4.1 Bearing kinematics 4.2 Vibrations of bearing elements 4.3 Bearing vibrodiagnosis methods		2 hours
Lecture 5 Vibrodiagnosis of gear drives 5.1 Gear vibrations 5.2 Methods of vibrodiagnosis of gear transmissions 5.3 Gear condition monitorin		2 hours
Lecture 6 Diagnosis of unbalance of rotating parts 6.1 Diagnosis of coupling unbalance 6.2 Diagnosis of shaft unbalance 6.3 Torsional vibrations of shafts		2 hours
Bibliography: Radeş, M. , <i>Dinamica maşinilor, vol. III.</i> , Editura Printech, Bucureşti, 2008 Gafiţanu, M. ş.a. , <i>Diagnosticarea vibroacustică a maşinilor şi utilajelor</i> , Editura Tehnică, Bucureşti, 1989 Klein U. , <i>Schwingungsdiagnostische Beurteilung von Maschinen und Anlagen</i> , Stahleisen Verlag, Duesseldorf, 2008		
8.2 Seminars	Teaching methods	Comments
8.3 Laboratories	Teaching methods	Comments
L1. Occupational safety rules applicable in the laboratory	The students are checked on the topic of the laboratory work and then the practical work is carried out under the supervision of the teacher. The values of various parameters are determined and interpreted.	2 hours
L2. Study of stands for testing mechanical equipmentStudy of stands for testing mechanical equipment		2 hours
L3. Vibrodiagnosis of gear drives		4 hours
L4. Vibrodiagnosis of bearings		4 hours
L5. Vibrodiagnosis of belt drives		2 hours
L6. Vibrodiagnosis of chain drives		2 hours
L7. Rotor balancing study		2 hours
L8. Torsional vibration study of shafts		6 hours
L9. Limits of machine vibrations		2 hours
L10. Final discussion. End of laboratory activities		2 hours

Bibliography:

Radeş, M., *Dinamica maşinilor, vol. III.*, Editura Printech, Bucureşti, 2008

Gafiţanu, M. ş.a., *Diagnosticarea vibroacustică a maşinilor şi utilajelor*, Editura Tehnică, Bucureşti, 1989

Ianici, S., Ianici, D., *Testarea sistemelor mecanice*, Ed. Eftimie Murgu, Reşiţa, 2010

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

- The content of the course meets the deontological requirements of doctoral research in mechanical engineering, addressed nationally and internationally, constituting prerequisites for the development of professional and academic skills of doctoral students.

10. Examination (by request)

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Weight in the final grade
10.4 Lectures	Participation in debates	Attendance, number of interventions	5%
	Level of knowledge acquired	Examination	65%
10.5 Seminars / laboratory classes	Involvement in activities	Laboratory attendance, number of interventions	5%
	Level of theoretical and practical skills acquired	Laboratory workbook	25%
10.6 Minimum performance standard			
<ul style="list-style-type: none">• Promoting applied activities;• Passing each subject of the exam with a mark of 5.			

Date of issue

Signature of the teacher responsible for lectures

Signature of the teacher responsible for seminars

October 2022

Conf. univ. dr. ing. abil. Zoltan-Iosif KORKA

Conf. univ. dr. ing. abil. Zoltan-Iosif KORKA

Signature of the doctoral school director

Conf. univ. dr. ing. abil. Zoltan-Iosif KORKA