

Course Title: Vibroacoustic Machine Diagnostics	
Institute/Division:	Department of Automation and Computer Engineering Faculty of Electrical and Computer Engineering
Course code:	E-VMD
Erasmus subject code:	0714 Electronics and automation
Number of contact hours:	45
Course duration:	1 semester (Spring/Summer)
ECTS credits:	6
Course description:	<p>analyzing, and assessing the condition of mechanical systems. It is designed for Erasmus students with a background in electrical and mechanical engineering, mechatronics, or related fields who wish to develop practical and analytical skills in modern condition monitoring techniques.</p> <p>The course covers the fundamental theory of vibrations and acoustics in machinery, including signal generation, propagation, and measurement. Students will learn how to interpret vibration and acoustic signals to identify faults such as imbalance, misalignment, bearing damage, gear defects, and structural resonances. Emphasis is placed on both time-domain and frequency-domain analysis, including the use of FFT, spectral analysis, and advanced signal processing methods.</p> <p>Practical laboratory sessions form a core component of the course, allowing students to work with industry-standard sensors (accelerometers, microphones), data acquisition systems, and diagnostic software tools. Through case studies and real-world examples, participants will gain experience in diagnosing machine condition, evaluating severity of faults, and proposing maintenance actions.</p> <p>Main course areas:</p> <ul style="list-style-type: none"> • Understand the physical basis of vibroacoustic phenomena in machines; • Acquire and process diagnostic signals using appropriate instrumentation; • Apply analytical techniques to detect and classify mechanical faults; • Interpret diagnostic results in the context of predictive maintenance strategies; • Communicate findings in a clear and engineering-oriented manner; <p>The course integrates theoretical lectures with hands-on training, preparing students for roles in maintenance engineering, reliability engineering, and industrial diagnostics within modern smart manufacturing environments.</p>
Course type:	Lectures (15h), Laboratory (30h)
Literature:	Dhanesh N. Manik, "Vibro-Acoustics Fundamentals and Applications"



Colin Hansen, "Foundations of Vibroacoustics"
David A. Bies, Colin Hansen, Carl Howard, Kristy L. Hansen, "Engineering Noise Control"

Assessment method: Laboratory exercises reports, mini-project report

Prerequisites: -

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