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| Óbuda UniversityBánki Donát Faculty of Mechanical and Safety Engineering | | | | | | | | | | | | | | | | | Insitute of Mechatronics and Vehicle Engineering | | | | | | | | | | | |
| **Subject title and code:** | | | | | | | | **Mechatronic's System Diagnostics -BMXMDE6BNE** | | | | | | | | | | | | | | | | **Credits:** | | | | 3 |
| Full-time study | | | | | 2023/2024 | | | | | | ac. year | | | 2. | | semester | | | | | | | | | | | | |
| **The course is available at:** | | | | | | | | | | | | mechatronical engineering | | | | | | | | | | | | | | | | |
| **Supervised by:** | | | | | | | **Dr. Szabó József Zoltán** | | | | | | | | | | | **Instructors:** | **Dr. Dömötör Ferenc,**  **Dr. Szabó József Zoltán** | | | | | | | | | |
| **Prerequisite (neptun code):** | | | | | | | | | | | | |  | | | | | | | | | | | | | | | |
| **Weekly number of lessons** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Lecture: | 2 | | | | | Group seminar: | | | | | | |  | | | | Lab: | | | | |  | Consultation: | | | |  | |
| **Way of assessment:** | | | | | | Exam | | | | (Written) | | | | | | | | | | | | | | | | | | |
| ***Online consultation*** *(in case it’s required):* | | | | | | | | | | | | | | | *… (BBB link)* | | | | | | | | | | | | | |
| **Edu. goal**: | | | *Students have to learn the modern diagnostic methods, used in operation of machines and mechatronic systems and the instruments, and their applications* | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Schedule** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Education week | | **Topics** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. | | General introduction about the details of the subject and the requirements. Basics. Value reduction processes of the systems of mechatronics. The most common faults in mechatronics, typical ways of failures | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. | | Basics of maintenance and diagnostics – part I. Traditional maintenance strategies, and ways of operation. Run to failure, planned preventive maintenance, condition monitoring based maintenance strategies. Modern maintenance philosophies: RCM, TPM, TQM, RBI. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3. | | Theory of vibration – part I. Understanding vibrations. Damped and undamped vibrations. Time of period, frequency, amplitude and phase, time signal and frequency spectrum. Understanding FFT Fast Fourier Transformation. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4. | | Theory of vibration – part II. Processing of vibration signals. Instruments of vibration measurements. Faults monitored by vibration diagnostics. Application of FFT in the diagnostics.Measurement practices using vibration analyser and VIBROTESTER test rig. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5. | | In situ balancing of rotating machinery. Basics of theory and practical applications, using VIBROTESTER test rig. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6. | | Understanding shaft alignment. Theory and application. Misalignment in practice using the tool COMBI-LASER on the test rig VIBROTESTER | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7. | | **Teaching break 28.03.** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8. | | **1st WRITTEN TEST – condition of acceptance (and part of exam)** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9. | | Theory of electromagnetic waves. Methods of non destructive testing (NDT), like X-Ray, isotope radiation. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10. | | Theory and practical applications. Understanding endoscopy. Theory and practice. Case histories | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11. | | The role of thermography in diagnostics. Understanding non contacting temperature measurements. Theory of thermovision. Examples of practical application. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12. | | Understanding noise diagnostics. Theory of sound. Noise measurement techniques with practical examples of application. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13. | | Motor current analysis. Oil, and wear check. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14. | | **2nd WRITTEN TEST – condition of acceptance (and part of exam)** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Mid-semester requirements** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test | | | | | | | | | Assignment to be submitted | | | | | | | | | | | | Lab measurement | | | | | | | |
| amount | | | | dates | | | | | amount | | | | | | | | deadlines | | | | amount | | | | dates | | | |
| 2 | | | | 8. and 14. | | | | |  | | | | | | | |  | | | |  | | | |  | | | |
| *According to the TVSZ attendance of group seminars and lab exercises are mandatory.* | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Other requirements for participation in sessions not covered by the regulations and restrictions on substitutions: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test | | | | | | | | | Assignment to be submitted | | | | | | | | | | | Lab measurement | | | | | | | | |
| maximum points available | | | | minimum score required to pass /test | | | | | maximum points available | | | | | | | | | minimum score required to pass / assignment | | maximum points available | | | | | | minimum score required to pass /lab | | |
| 100points | | | | 60points | | | | | …points | | | | | | | | | …points | | …points | | | | | | …points | | |

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| **Total number of points achievable in semester:** | | | | | | | …points | | |
| **Grading thresholds** | **satisfactory**  60 choose | | | | **average**  72 choose | | | **good**  83 choose | **excellent**  94 choose |
| Other evaluation criteria: | | | | | | | | | |
| During the period of lectures tasks can be reparated/corrected at dates/time shown above by students, participating on more than 60% of lectures and laboratory exercises.  Acceptance shall be provided to the students, passing both written tests at least at “satisfactory” level, and made up his tasks if being absent with a good reason during the time of tests.  A recommended note can be given to a student passing both written tests at least at a level of medium (3) during the normal occasions of tests. No recommended note can be given for a successful passing during the reparation/correction time.  Unacceptable note shall be given to the student missing from more than 40% of the lectures, or not passing the written tests neither during normal, nor reparation/correction time, or both tests are unacceptable. | | | | | | | | | |
| **Receive a signature denied entry:** | | | |  | | | | | |
| **Required references:** | | | [1.] Learning Materials of the lectures, and Videos in Moodle system | | | | | | |
| **Recommended references:** | | [1.] Scheffer-P.Girdhar: Practical Machinery Vibration Analysis & Predictive Maintenance , Verlag: Newnes 2004)  [2.] R.Keith Mobley: Vibration fundamentals (Newnes 2000) | | | | | | | |
| **Quality assurance methods of the subject:** | | | | | |  | | | |

Things, that are not included, can be found within the regulations of Óbuda University.