|  |  |
| --- | --- |
| 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 |

|  |  |
| --- | --- |
| **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.