Course title: Dynamics of machine tools	**Neptun code: GESGT415a**

Course coordinator: Dr. Szabó Tamás, associate professor, PhD

type and number of lesson: **lecture**/seminar/practical lesson/consultation, **2** / week or semester

method of accountability: **colloquium**

curriculum location of the subject: **autumn**

pre-study conditions:

The task and purpose of the subject:

An introduction to the dynamic problems of machine tools for mechanical engineering students. Creation of simple dynamic models based on calculation examples.

Course description:

Servo drives in auxiliary drives. Auxiliary drives of NC machines, dynamic problems, design of main and auxiliary drives of NC machines according to dynamic aspects. Calculation of natural cycle frequencies for the twisting oscillations of belt-driven spindles and gear drives. Critical rotation speeds of axes in the case of precession movements. Vibrations of plates and covers. Simpler nonlinear swings. Parametrically excited oscillations of belt drives, stability problems. Plastic forming machines: design of main drive, motor - flywheel system. Foundation issues of molding machines. Designing the spring matrix of multi-degree-of-freedom machine foundations. Anti-vibration tasks. Properties of undertuned and overtuned machine bases. Computer simulations and analytical testing options in machine design.

Required literature:

1. B. C. Gegg, C. Steve Suh, and Albert, Machine Tool Vibrations and Cutting Dynamics. Springer New York, NY, 2011. doi: https://doi.org/10.1007/978-1-4419-9801-9.
2. G. J. Wiens and D. S. Hardage, “Dynamics and Controls of Hexapod Machine Tools,” Springer eBooks, pp. 217–225, Jan. 1999, doi: https://doi.org/10.1007/978-1-4471-0885-6_14.
3. “Machine Tool Vibrations,” Springer eBooks, pp. 801–801, Jan. 2014, doi: https://doi.org/10.1007/978-3-642-20617-7_100264.

Recommended literature:

1. C. Brecher and M. Weck, “The Dynamic Behavior of Machine Tools,” Lecture notes in production engineering, pp. 621–749, Jan. 2021, doi: https://doi.org/10.1007/978-3-662-60863-0_13.
2. Machining Dynamics. 2009. doi: https://doi.org/10.1007/978-1-84628-368-0.