COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2023/2024 SEMESTER AUTUMN

Name of Course	***STRUCTURAL DYNAMICS I***
Course Code	**MSB387AN-EA-00**
Allotment of Hours per Week	**2 lecture**
Number of Credits	**2**
Program	**Civil Engineering BSc**
Evaluation	**EXAM**
Semester	**Autumn 2020/2021**
Prerequisites	**Mechanics II. (Dynamics), Statics III**
Department	**Department of Civil Engineering**
Instructor	**1- 7 weeks: Adél Len Dr.** **8-15 weeks: Vanda Olimpia Pomezanski Dr.**

INTRODUCTION, GENERAL COURSE DESCRIPTION

The aim of the course is to present the basics of vibrations of mechanical structures in civil engineering: elements of vibrating mechanical models (mass, stiffness, rigid and elastic elements); to introduce the students into the analysis of the vibration of one, two or more degrees of freedom mechanical systems, into the modelling of these systems and into the study of the response of mechanical structures to dynamic loads.

LEARNING OBJECTIVES

Methodology: The objective of the course is to introduce the students into the topic of Vibrations, starting from the basics of analysing simple vibrating systems, up to more complex, multi degrees of freedom systems, which can give a good basis especially for the seismic design of the structures.

The following topics will be discussed:
- one degree of freedom vibrating systems: modelling, undamped and damped vibrations, free and excited vibrations
- two or more degrees of freedom systems free and excited vibrations, analytical and numerical methods, the effect of damping on these systems
- excitation by support displacement, mechanical background of seismic design

LECTURE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	-	-	-	-
2.	Introduction. Types of 1DoF mechanical systems. Modelling vibrating systems. Free, undamped vibrating systems (Dr. Adél Len)	[1.] pages 583-586 [2.] pages 3-7 and 9-19		
3.				
4.				
5.	Vertical, undamped vibrations in gravitational field. Linearization. Pendulum. Damping (Dr. Adél Len)	[1.] pages 586-587 [2.] pages 19-24		
6.	Free, damped, harmonic vibrating systems. Excited vibrations (Dr. Adél Len)	[1.] pages 587-591 and 600-606 [2.] pages 24-30		
7.				
8.	Matrix differential equation of 2DOF mechanical systems. Examples. (Dr Vanda Olimpia Pomezanski)	[3] sec 7. pp.173-191,[4]	Midterm exam 1. (Dr. Adél Len)	
9.				
10.	Stiffness matrix definition by the flexibility matrix. Examples. Stiffness matrix definition by the elementary stiffness matrices. Examples. (Dr Vanda Olimpia Pomezanski)	[3] sec 8. pp. 192-218,[4]		
11.	-			

12.	Solution of 2DOF mechanical systems in the field of eigenvalues. Examples. 2DOF damped vibration systems. Examples.	[3] sec 9. pp. 219-248,[4]	Midterm exam 2. (Dr Vanda Olimpia Pomezanski)	
13.	Support vibration of 1DOF and 2DOF mechanical systems. Examples. (Dr Vanda Olimpia Pomezanski)	[3]sec 23-24. pp. 575-609,[4]		

ATTENDANCE AND GRADING

Attendance:

In accordance with the Code of Studies and Examinations of the University of Pécs, Article 45 (2) and Annex 9. (Article 3) a student may be refused a grade or qualification in the given full-time course if the number of class absences exceeds 30% of the contact hours stipulated in the course description. Attending (personal presence or on-line) is required in all classes.

Grading, opportunity, and procedure for re-takes:

Accumulated knowledge is tested in two midterm exams. The second midterm exam will be a “homework”, an assignment that must be submitted for the given deadline. If it is submitted, then there will be a correction possibility for that. If the assignment is not submitted in time than it is failed. Failed or skipped midterm exam can be repeated once (first week of the exam period).

Mid-term assessments, performance evaluation and their ratio in the final grade (The samples in the table to be deleted.)

Type	Assessment	Ratio in the final grade
Test 1	100 points	50 %
Test 2	100 points	50 %

Requirements for the end-of-semester signature

Mid-term assessment of 40%

Type of examination (written, oral):

The final exam will be written or oral (2x100 points for the two parts), with personal presence. The result of each exam part must reach the minimum acceptable level (40% of the maximum points).

Registering for the final exam is only possible with the completed midterm exams.

The exam is successful if the result is minimum 40%.

Calculation of the grade (TVSz 47§ (3))

The mid-term performance accounts for 200 points, 50%, the performance at the exam accounts for 200 points, 50% in the calculation of the final grade.

Calculation of the final grade based on aggregate performance in percentage.

Course grade	Performance in %
excellent (5)	85 % …100 %
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	0 % … 40 %

The lower limit given at each grade belongs to that grade.

COMPULSORY READING AND AVAILABILITY

[1.] J.L. Meriam, L.G. Kraige, 2003: Engineering Mechanics, Dynamics. John Wiley and Sons. 2003

[2.] A. Zingoni, 2015: Vibration Analysis and Structural Dynamics for Civil Engineers, Taylor and Francis Group, Boca Raton, Lodon, New York

[3] Mario Paz, Young Hoon Kim 2004: Structural Dynamics, Theory and Computation, Sixth Edition, Springer, Cham, Switzerland

RECOMMENDED LITERATURE AND AVAILABILITY

[4.] Lecture slides – Microsoft Teams

[5.] Beer, F.P., Johnston, E. R.: Vector Mechanics for Engineers., 2004: Dynamics, McGraw-Hill

[6.] William T. Thomson, 1996: Theory of Vibration with application, Springer Science and Business Media