COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2023/2024 SEMESTER 2

Course title	*Stability of Structures*
Course Code	*MSM411ANEP*
Hours/Week: le/pr/lab	*2 / 0 / 0*
Credits	*3*
Degree Programme	*Structural Engineering MSc/ obligatory*
Study Mode	*full time*
Requirements	*exam grade*
Teaching Period	*spring semester*
Prerequisites	*MSM405ANEP Structures 1.*
Department(s)	*Department of Civil Engineering*
Course Director	*Dr. Attila FÜLÖP associate professor*
Teaching Staff	*Dr. Attila FÜLÖP associate professor*

COURSE DESCRIPTION

Introduction to the theory of structural stability. The possible ways of reaching load bearing capacity, definition of static loading, methods of producing structural static models. Mathematical backgrounds of stability design (static method /eigenvalue problem/, energy method /variational problem/, kinematic method). Planar and 3D buckling problems of general bars, frames and trusses. Investigation of the local plate buckling of plates and plated structures (linear and non-linear); analysis of the post-critical (post-buckling) behaviour and the post-critical load-bearing capacity.

SYLLABUS

1. GOALS AND OBJECTIVES

Introduction to the theory of structural stability. The possible ways of reaching load bearing capacity, definition of static loading, methods of producing structural static models. Mathematical backgrounds of stability design (static method /eigenvalue problem/, energy method /variational problem/, kinematic method). Planar and 3D buckling problems of general bars, frames and trusses. Investigation of the local plate buckling of plates and plated structures (linear and non-linear); analysis of the post-critical (post-buckling) behaviour and the post-critical load-bearing capacity.

2. COURSE CONTENT

	TOPICS
LECTURE AND PRACTICE	1. *Introduction. Course description. Orientation.* 2. *Main rules of the theory of structural stability* 3. *Plane Buckling of Struts* 4. *Stability Functions* 5. *Buckling of columns. The buckling shape of the compressed bars and the determination of the buckling length.* 6. *Buckling resistance of compressed columns according to Eurocode 3* 7. *Stability of non-uniform, locally weakened and couple-sectioned columns.* 8. *Stability of arches.* 9. *Lateral torsional buckling of beams* 10. *Ayrton-Perry formula* 11. *Plate and shell buckling.* 12. *Exam*

DETAILED SYLLABUS AND COURSE SCHEDULE

LECTURE AND PRACTICE

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Introduction. Course description. Orientation. Main rules of the theory of structural stability	[1] [2]		
2.	Plane Buckling of Struts	[1] [2]		
3.	Stability Functions	[1] [2]		
4.	Buckling of columns. The buckling shape of the compressed bars and the determination of the buckling length.	[1] [2]		
5.	Buckling resistance of compressed columns according to Eurocode 3	[1] [2]		
6.	Stability of non-uniform, locally weakened and couple-sectioned columns.	[1] [2]		
7.	Stability of arches.	[1] [2]		
8.	Lateral torsional buckling of beams	[1] [2]		
9.	Spring holiday			
10.	National holiday (Easter Monday)	[1] [2]		
11.	Ayrton-Perry formula	[1] [2]		
12.	Plate and shell buckling.	[1] [2]		
13.	Exam	[1] [2]		
14.	Consultation		HW	

3. ASSESSMENT AND EVALUATION

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.

Method for monitoring attendance

attendance sheet

ASSESSMENT

Course-unit with final examination

Mid-term assessments, performance evaluation and their weighting as a pre-requisite for taking the final exam

Type	**Assessment**	***Weighting as a proportion of the pre-requisite for taking the exam***
1. ***home assignment (project documentation)***	*max 90 points*	*90 %*
2. ***attendance***	*max 10 points*	*10 %*

Requirements for the end-of-semester signature

mid-term assessment of 40%

Re-takes for the end-of-semester signature (PTE TVSz 50§(2))

The specific regulations for grade betterment and re-take must be read and applied according to the general Code of Studies and Examinations. E.g.: all the tests and the records to be submitted can be repeated/improved each at least once every semester, and the tests and home assignments can be repeated/improved at least once in the first two weeks of the examination period.

The Exam can be retake once, if it not reaches the min 40%.

Type of examination *(written, oral): written*

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

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

The mid-term performance accounts for ***50*** %, the performance at the exam accounts for ***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 % – 84%
satisfactory (3)	55 % – 69%
pass (2)	40 % – 54%
fail (1)	0 % – 39%

4. SPECIFIED LITERATURE

COMPULSORY READING AND AVAILABILITY

[1.] Electric material in TEAMS

RECOMMENDED LITERATURE AND AVAILABILITY

[2] Iványi, M. - Skaloud, M.: Steel Plated Structures, CISM Courses and Lectures No 358, International Centre for Mechanical Sciences, SPRINGER - Verlag, Wien - New York, 1995, p. 373. ISBN: 3-211-82742-0

[3] Timoshenko, S. – Gere, J.M.: Theory of elastic stability, McGraw-Hill Book, New York, 1961

[4] Stephen P. Timoshenko, James M. Gere : Theory of Elastic Stability, Dover Publications, 2012

[5] Chajes, A.: Principles of structural stability theory, Prentice-Hall, 1974, ISBN 978 013 7099 64 1

[6] Zdenek P. Bazant, Luigi Cedolin: Stability of Structures, Courier Dover Publications, 1991

[7] Theodore V. Galambos ed.: Guide to stability design criteria for metal structures, 5th ed., John Wiley & Sons, Inc., 1998