COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2022/23 SEMESTER AUTUMN

Course title	***Mathematics for Civil Engineering***
Course Code	***MSM083ANEP***
Hours/Week: le/pr/lab	***1/2/0***
Credits	***4***
Degree Programme	***MSc***
Study Mode	***Full-time***
Requirement type	***Examination***
Teaching Period	***Autumn***
Prerequisites	***-***
Department(s)	**Department of Engineering Mathematics**
Course Director	***Ákos PILGERMÁJER***
Teaching Staff	***Ákos PILGERMÁJER***

COURSE DESCRIPTION

A short description of the course (max. 10 sentences).
Neptun: Instruction/Subjects/Subject Details/Basic data/Subject description

After the necessary and intuitive theoretical introduction some typical examples are discussed and solved followed by more difficult or simply just much bigger ones where MATLAB software will be used for numerical or even symbolic computations. Some of those numerically efficient methods are discussed. At the end of each topic students should have the appropriate mathematical knowledge to identify, compare and choose the appropriate mehtods from the known ones and then correctly apply, interpret them.

SYLLABUS

Neptun: Instruction/Subjects/Subject Details/Syllabus

1. GOALS AND OBJECTIVES

Goals, student learning outcome.
Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction (ez szerepel a neptunban)

After the necessary and intuitive theoretical introduction some typical examples are discussed and solved followed by more difficult or simply just much bigger ones where MATLAB software will be used for numerical or even symbolic computations. Some of those numerically efficient methods are discussed. At the end of each topic students should have the appropriate mathematical knowledge to identify, compare and choose the appropriate mehtods from the known ones and then correctly apply, interpret them.

2. COURSE CONTENT

Neptun: Instruction/Subjects/Subject Details/Syllabus/Subject content

	TOPICS
LECTURE	1. *Introduction to MATLAB* 2. *Computational errors* 3. *Roots of non-linearfunctions* 4. *System of linear equations* 5. *Approximation methods* 6. *Numerical differentiation, integration* 7. *Solving first, second order ODEs numerically*
PRACTICE	-
LABORATORY PRACTICE	1. *Introduction to MATLAB* 2. *Computational errors* 3. *Roots of non-linearfunctions* 4. *System of linear equations* 5. *Approximation methods* 6. *Numerical differentiation, integration* 7. *Solving first, second order ODEs numerically*

DETAILED SYLLABUS AND COURSE SCHEDULE

ACADEMIC HOLIDAYS INCLUDED

LECTURE				
week	**Topic**	**Compulsory reading; page number (from ... to ...)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Introduction to MATLAB 1.			
2.	Introduction to MATLAB 2.			
3.	Machine numbers, computational errors			
4.	Inner products, norms, sensitivity analysis			
5.	Roots of univariate, non-linear functions			
6.	Systems of linear equations, direct methods			
7.	Systems of linear equations, iterative methods			
8.	Eigenvalue problems, diagonalizability			
9.	Autumn break			
10.	Regression and interpolation			
11.	Curve fitting by least squares method			
12.	Numerical differentiation, integration			
13.	Solving first order ODEs (Picard iteration, Taylor expansion, Euler, Heun, Runge-Kutta)			
14.	Solve second order ODEs with Euler's method and using finite differences			
15.	Classify partial differential equations, special examples and numerical solutions by means of central differences			

PRACTICE, LABORATORY PRACTICE				
week	**Topic**	**Compulsory reading; page number (from ... to ...)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	Introduction to MATLAB 1.			
2.	Introduction to MATLAB 2.			
3.	Machine numbers, computational errors			
4.	Inner products, norms, sensitivity analysis		Homework	10.03 12:00
5.	Roots of univariate, non-linear functions			
6.	Systems of linear equations, direct methods			
7.	Systems of linear equations, iterative methods			
8.	Eigenvalue problems, diagonalizability		Homework	11.07 12:00
9.	Autumn break			
10.	Regression and interpolation			
11.	Curve fitting by least squares method		Homework	11.21 12:00
12.	Numerical differentiation, integration			
13.	Solving first order ODEs (Picard iteration, Taylor expansion, Euler, Heun, Runge-Kutta)			
14.	Mid-term test (MTT)		MTT	In laboratory class
15.	Retake		Retake	In laboratory class

3. ASSESSMENT AND EVALUATION

(Neptun: Instruction/Subjects/Subject Details/Syllabus/Examination and Evaluation System)

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 *(e.g.: attendance sheet / online test/ register, etc.)*
attendance sheet / online test

ASSESSMENT

Cells of the appropriate type of requirement is to be filled out (course-units resulting in mid-term grade or examination). Cells of the other type can be deleted.

Course-unit with final examination

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

(The samples in the table to be deleted.)

Type	Assessment	*Weighting as a proportion of the pre-requisite for taking the exam*
Mid-term test	*Max 100 points*	*70 %*
Homeworks	*Max 50 points*	30 %

Requirements for the end-of-semester signature

(Eg.: mid-term assessment of 40%)

Each student earns the **course (end-of-semester) signature** if and only if the weighted average in percent of its midterm test (must be at least 40%) and the homeworks in total reaches 40% (see formula (*)). This summary percentage is called the **midterm result**:

(*) **midterm result** % = 0.7*(midterm test %)+0.3*(homeworks %)

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.

Last week of semester (15th) in laboratory class.

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

The exam is successful if the result is minimum ***40*** ***%.*** *(The minimum cannot exceed 40%.)*

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

Only those who have course signature can take **exam**s (at most three in the exam period) for which one must register in advance in Neptun.
If the midterm test is better than 70% at first and the student earned the course signature, then I offer the **final mark** as the midterm result suggests by the grading scale table below. This is called **offered grade** (must be accepted or rejected in Neptun).
If one cannot earn an offered grade or does not accept it, but has course signature, then takes an exam.
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 % ...
good (4)	70 % ... 85 %
satisfactory (3)	55 % ... 70 %
pass (2)	40 % ... 55 %
fail (1)	below 40 %

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

4. SPECIFIED LITERATURE

In order of relevance. (In Neptun ES: Instruction/Subject/Subject details/Syllabus/Literature)

COMPULSORY READING AND AVAILABILITY

[PL] Piroska Laky dr., *Numerical Methods for Civil Engineers with Matlab*, Budapest, 2020

RECOMMENDED LITERATURE AND AVAILABILITY

[M] Matlab online course materials: www.matlab.com
[EL] Corresponding Moodle, Teams course materials