COURSE SYLLABUS AND COURSE REQUIREMENTS
ACADEMIC YEAR 2022/2023 SEMESTER 2

Course title	*Engineering Mathematics 2*
Course Code	MSB294, MSB594, IVB292
Hours/Week: le/pr/lab	2/2/0
Credits	4
Degree Programme	Civil-, Electrical-, Computer Science Engineering BSc
Study Mode	Full-time schedule
Requirements	Exam
Teaching Period	Semester 2
Prerequisites	Engineering Mathematics1
Department(s)	Department of Engineering Mathematics
Course Director	*Ildikó* Perjésiné Hámori dr.
Teaching Staff	*Ildikó* Perjésiné Hámori dr.

COURSE DESCRIPTION

The presentations give an introduction to important mathematical techniques of exercise solving and the basic theory of calculus. Equal emphasis is given to learning new mathematics and to learning how to construct and write down correct mathematical arguments.
Upon completion of this course, the student should be able to: interpret, and put it into practice

a. application of derivation,
b. integralcalculus in one variable,
c. differential and integralcalculus in two variable
d. differential equations

SYLLABUS

1. GOALS AND OBJECTIVES

Goals, student learning outcome.
Neptun: Instruction/Subjects/Subject Details/Syllabus/Goal of Instruction

This lecture and practical-based course aim to give computer science-, civil- and electrical engineering students a solid mathematics basis by covering the following topics:

- Application of derivation: testing functions, solving applied optimization problems.
- Integral calculus: antiderivatives, basic integration formulas, techniques of integration: integration by parts, by substitution, integral of rational functions by partial fraction, integral of the trigonometric function. Definite integral, Riemann-sum, numerical integration. The fundamental theorem of calculus: Newton-Leibniz theorem. Applications of integral: the area between curves, volumes by slicing and rotation about an ax, length of a plane curve, areas of surfaces of revolution. Improper integration.
- Functions of two variables: partial derivatives, directional derivatives, gradient vector. Double integrals.
- Differential Equations: First-order separable and linear differential equations, Second-order linear differential equations with constant coefficients

Students learn the basics of mathematics enabling them to interpret and understand engineering sciences and through solving elementary tasks; they deepen their basic theoretical knowledge in the field of engineering. The practical sessions are designed to complement the requirements of different specializations.

2. COURSE CONTENT

	TOPICS
LECTURE AND PRACTICE	- *L'Hospital rule, linear approximation, Taylor polynomial.* - *Applications of differential calculus to the study of properties of functions* - *Solving applied optimization problems. Antiderivatives, basic integration formulas.* - *Integration by parts, integral by substitution.* - *Integral of rational functions by partial fraction, integral of trigonometric functions* - *Definite integral, Riemann-sum, numerical integration, Newton-Leibniz theorem, applications of integral: area* - *Applications of integral: the area between curves, volume, length, areas of surfaces.* - *Improper integration. The function of two variables. Partial derivatives,* - *Directional derivatives, gradient vector* - *Double integral* - *First-order separable and linear differential equations* - *Second-order linear differential equations with constant coefficients.*

DETAILED SYLLABUS AND COURSE SCHEDULE

LECTURE AND PRACTICE

M: Möbius unit C: Compulsory reading

week	**Topic**	**Compulsory reading; page number (from … to …)**	**Required tasks (assignments, tests, etc.)**	**Completion date, due date**
1.	*L'Hospital rule, linear approximation, Taylor polynomial*	C: 2.a. 1-6	M: Application of derivatives 1	…
2.	*Applications of differential calculus to the study of properties of functions*	C: 2.a. 7-12	M: Application of derivatives 2	
3.	*Solving applied optimization problems. Antiderivatives, basic integration formulas*	C: 2.a. 13 C: 2.b. 1-4	M: Application of derivatives 2, Antiderivatives 1	
4.	*Integration by parts, integral by substitution*	C: 2.b. 5-7	M: Antiderivatives 2, Homework 1	At the beginning of class week 5
5.	*Midterm 1*		M: Midterm 1	
6.	*Integral of rational functions by partial fraction, integral of trigonometric functions*	C: 2.b. 8-10	M: Antiderivatives 3	
7.	*Definite integral, Riemann-sum, numerical integration, Newton-Leibniz theorem, applications of integral: area*	C: 2.c. 1-11	M: Definite integral 1	
8.	*Applications of integral: the area between curves, volume, length, areas of surfaces*	C: 2.c. 12-19	M: Definite integral 2	
9.	*Spring break*			
10.	*Improper integration. The function of two variables. Partial derivatives*	C: 2.c. 20-22 C: 2.d. 1-7	M: Function of two variables 1	
11.	*Directional derivatives, gradient vector*	C: 2.d. 8-10	M: Function of two variables 1	
12.	*Double integral*	C: 2.d. 11-15	M: Function of two variables 2	

13.	*First-order separable and linear differential equations*	C: 2.e. 1-12	M: Differential equation 1	
14.	*Second-order linear differential equations with constant coefficients*	C: 2.e. 13-19	M: Differential equation 2, Homework 2	At the beginning of class week 15
15.	*Midterm 2*		M: Midterm 2	

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

Attendance sheet

ASSESSMENT

Course resulting in mid-term grade *(PTE TVSz 40§(3))*

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 offered grade	Ratio in the final grade
Homework (2 homework on Möbius TA platform)	*sum 100 points*	*10 %*	*5 %*
Mid-term exams (2 midterms, practice – solution of exercises on Möbius TA platform)	*sum. 100 points*	*90 %*	*45 %*
Signature requirements: Writing 2 midterm tests with a minimum 40%, submitting 2 homework.			
Offered exam grade: over 55 % during the study and correction period.			
Written exam in the exam period on Möbius TA platform. A minimum of 40% is required to pass the exam.			50 %

Opportunity and procedure for re-takes (PTE TVSz 47§(4))

Retake the midterms in the 1st week of the exam period

Grade calculation as a 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.

Type of examination *(written, oral):* *Written exam on Möbius TA platform*

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

4. SPECIFIED LITERATURE

COMPULSORY READING AND AVAILABILITY

[1] George B. Thomas, Jr.: Thomas' Calculus, Pearson Addision Wesley, 2005.

[2] Subject Materials on Teams platform:

- **a.** Application of derivatives.pptx
- **b.** Indefinite integral.pptx
- **c.** Definite integral.pptx
- **d.** Function of two variables.pptx
- **e.** Differential equations.pptx

[3] Week by week assignments on Möbius platform

RECOMMENDED LITERATURE AND AVAILABILITY

[4] https://www.khanacademy.org/math/ap-calculus-ab/ab-diff-analytical-applications-new/ab-5-8/v/analyzing-a-function-with-its-derivative

[5] https://www.khanacademy.org/math/integral-calculus/ic-integration/ic-common-indefinite-integrals/v/antiderivative-of-x-1

[6] https://www.khanacademy.org/math/integral-calculus

[7] https://www.khanacademy.org/math/multivariable-calculus

[8] https://www.khanacademy.org/math/differential-equations