

# SYLLABUS

REGARDING THE QUALIFICATION CYCLE FROM 2026 TO 2029  
ACADEMIC YEAR 2027/2028

## 1. BASIC COURSE/MODULE INFORMATION

Course/Module title	Calculus 3
Course/Module code *	
Faculty (name of the unit offering the field of study)	Faculty of Exact and Technical Sciences
Name of the unit running the course	Institute of Mathematics
Field of study	Mathematics
Qualification level	First-cycle studies (Bachelor's)
Profile	General academic
Study mode	Full-time
Year and semester of studies	Year 2, Semester 3
Course type	Major subject
Language of instruction	English
Coordinator	Svetlana Mincheva-Kamińska, PhD
Course instructor	Svetlana Mincheva-Kamińska, PhD

\* - as agreed at the faculty

### 1.1. Learning format – number of hours and ECTS credits

Semester (no.)	Lectures	Classes	Laboratories	Seminars	Practical classes	Internships	others	ECTS credits
3	30	45						8

### 1.2. Course delivery methods

conducted in a traditional way

□ involving distance education methods and techniques

**1.3. Course/Module assessment** (exam, pass with a grade, pass without a grade)

Lecture – exam, classes – pass with a grade

**2. PREREQUISITES**

Knowledge of Calculus 1, Calculus 2
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**3. OBJECTIVES, LEARNING OUTCOMES, COURSE CONTENT, AND INSTRUCTIONAL METHODS**

**3.1. Course/Module objectives**

O1	Providing knowledge in the field of limit theory and differential calculus of functions of several variables, with particular emphasis on concepts and theorems concerning functions of two and three variables,
O2	Familiarization students with the basic applications in the field of limit theory and differential calculus of functions of several variables.

**3.2. COURSE/MODULE LEARNING OUTCOMES (TO BE COMPLETED BY THE COORDINATOR)**

Learning Outcome	The description of the learning outcome defined for the course/module	Relation to the degree programme outcomes
LO_01	The student knows and understands basic concepts and theorems in the field of limit theory and differential calculus of functions of several variables, proof techniques and examples.	K_W01, K_W03
LO_02	The student knows and understands the basic differences between the differential calculus of functions of one and several variables.	K_W04, K_W02
LO_03	The student is able to correctly formulate definitions and theorems in the field of limit theory and differential calculus of functions of several variables and use them to examine the properties of functions of several variables, determine extrema and calculate approximate values of functions.	K_U01, K_U02, K_U05

LO_04	The student is ready to expand their knowledge and improve competencies in the field of differential calculus and its applications.	K_K01, K_K02, K_K03
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### 3.3. Course content (to be completed by the coordinator)

#### A. Lectures

Content outline
<p>Limit and continuity of functions of several variables.</p> <p>Directional and partial derivatives of functions of several variables.</p> <p>Derivative and differentiability of functions of several variables, tangent hyperplane.</p> <p>Partial derivatives, derivatives and differentials of higher orders, Taylor's formula.</p> <p>Global, local and constrained extrema of functions of several variables.</p> <p>Differential calculus of mappings. Derivative of a composition of mappings.</p> <p>Local diffeomorphism theorem.</p> <p>Implicit functions of one and several variables.</p> <p>The implicit function theorem. Derivatives of implicitly defined functions.</p> <p>Local and global extrema of implicit functions.</p> <p>Tangent hyperplane to the graph of implicit functions.</p>

#### B. Classes, laboratories, seminars, practical classes

Content outline
<p>Limit and continuity of functions of several variables.</p> <p>Directional and partial derivatives of functions of several variables.</p> <p>Derivative and differentiability of functions of several variables, tangent hyperplane.</p> <p>Partial derivatives, derivatives and differentials of higher orders, Taylor's formula.</p> <p>Global, local and constrained extrema of functions of several variables.</p> <p>Differential calculus of mappings. Derivative of a composition of mappings.</p> <p>The local diffeomorphism theorem.</p> <p>Implicit functions of one and several variables.</p> <p>The implicit function theorem. Derivatives of implicitly defined functions.</p> <p>Local and global extrema of implicit functions of one and two variables.</p> <p>Tangent hyperplane to the graph of implicit functions.</p>

### 3.4. Methods of Instruction

**Lecture:** a problem-solving lecture/a lecture supported by a multimedia presentation

**Classes:** text analysis and discussion/project work (research project, implementation project, practical project)/ group work (problem solving, case study, discussion)/didactic games/ distance learning

## 4. Assessment techniques and criteria

### 4.1 Methods of evaluating learning outcomes

Learning outcome	Methods of assessment of learning outcomes (e.g. test, oral exam, written exam, project, report, observation during classes)	Learning format (lectures, classes,...)
LO_01	exam, knowledge tests and observation during classes	lectures
LO_02	exam, knowledge tests and observation during classes	lectures, classes
LO_03	knowledge tests, exam, observation during classes	lectures, classes
LO_04	observation during classes	classes

### 4.2 conditions for passing the course (assessment criteria)

Classes: passing on the basis of colloquia and activity in classes.

The condition for obtaining the completion of the classes is to obtain at least 50% of points from each colloquium. Being active during classes can increase the grade by a maximum of half a grade.

The final grade is determined according to the scale:

00 - 49 % of points – fail (2.0);

50 – 59 % of points – satisfactory (3.0); 60 – 69 % of points – satisfactory plus (3.5);

70 – 79 % of points – good (4.0); 80 – 89 % of points – good plus (4.5);

90 – 100 % of points – very good (5.5).

Lecture: written exam.

Assessment criteria: (percentage share in mastering knowledge – assessment)

00-49 % of points – fail (2.0);

50 – 59 % of points - satisfactory (3.0); 60 – 69 % of points - satisfactory plus (3.5);

70 – 79% pts.- good (4.0); 80 – 89% points – good plus (4.5);

90 – 100% points - very good (5.0).

The final grade from the exam is determined on the basis of a written exam and an interview with the student.

#### 5. Total student workload needed to achieve the intended learning outcomes – number of hours and ECTS credits

Activity	Number of hours
Course hours	75
Other contact hours involving the teacher (consultation hours, examinations)	15
Non-contact hours - student's own work (preparation for classes or examinations, projects, etc.)	110
Total number of hours	200
Total number of ECTS credits	8

\* One ECTS point corresponds to 25-30 hours of total student workload

#### 6. Internships related to the course/module

Number of hours	<i>Not applicable</i>
Internship regulations and procedures	<i>Not applicable</i>

## 7. Instructional materials

Compulsory literature:

1. R. Jerrard, *Multyvariable Calculus*, University of Toronto, [HTTP://UOFT.ME/MAT237-NOTES](http://uoft.me/mat237-notes)
2. Pauls Online Math Notes, Calculus 3, [CALCULUS III](#)
3. Paul Dawkins, *CALCULUS III*, [CALCIII COMPLETE.PDF](#)

Complementary literature:

1. M. Rachmani-Andebili, *Calculus III. Practice problems, Methods, and Solutions*, Springer
2. K. DeMason, S. Shabanov, *CONCEPTS IN CALCULUS III*, [SOLUTIONMANUAL.DVI](#)

Approved by the Head of the Department or an authorised person