Course Name : Mathematical Analysis II

Course Code	Course Type	Regular Semester	Lecture (hours/week)	Seminar (hours/week)	Lab. (hours/week)	Credits	ECTS
CMP 128	B	Spring	3.00	1.00	0.00	3.50	5.00

Lecturer	Elton Kaziu, Msc
Assistant	Vladimir Muka, Msc
Course language	Albanian
Course level	Bachelor
Description	The Mathematical Analysis 2 course covers the concepts of indefinite integral and definite integral. An important part of this course is multivariable functions, focusing on partial derivatives, applications in optimization, and multiple integrals. The course concludes with knowledge about number series and power series.
Objectives	1. The objective of the Mathematical Analysis 2 course is for students to acquire and apply mathematical techniques and concepts to solve advanced problems, developing their analytical and application skills in the field of mathematical analysis. 2. Application in the field of IT
Core Concepts	The fundamental concepts are the following: 1. Antiderivatives and indefinite integrals. 2. Techniques of integration. 3. Area and the Definite Integral. 4. The concept of the improper integrals. 5. Functions of Several Variables. Partial Derivatives. Implicit derivative. Differential of a function. 6. Optimization of functions of several variables. 7. Multiple integrals. 8. Sequences and convergence. Infinite series. Convergence tests for positive series. 9. Polinomials series. Power series. Representations of functions as power series

Course Outline

Week	Topic
1	Antiderivatives and indefinite integrals. Integration of functions of the form f(ax + b). Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 3-13. Recommended literature Ron Larson, Robert P. Hostetler, Bruce H. Edwards (2011)- Calculus I with Precalculus, 3rd Edition. page 406-410, Gilbert Strang (2023)- Calculus-Wellesley-Cambridge Press. page 763-776
2	Integration by Substitution. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 14-22 Recommended literature Ron Larson, Robert P. Hostetler, Bruce H. Edwards (2011)- Calculus I with Precalculus, 3rd Edition. page 447-456 Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen, Christopher J. Stocker, (2019) Calculus for Business, Economics, Life Sciences, and Social Sciences/ fourteenth edition. page 364-420 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 400-406
3	Techniques of integration. Integration by parts. Integration of rational functions by Partial Fractions Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 22-40 Recommended literature Robert A. Adams, Christopher Essex (2018) Calculus A Complete Course/ Ninth Edition. page 334-349 Gilbert Strang (2023)- Calculus-Wellesley-Cambridge Press. page 833-849 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 452-481
4	Area and the Definite Integral. The Fundamental Theorem of Calculus. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 41-54 Recommended literature Gilbert Strang (2023)- Calculus-Wellesley-Cambridge Press. page 784-816 Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen, Christopher J. Stocker, (2019) Calculus for Business, Economics, Life Sciences, and Social Sciences/ fourteenth edition. page 420-440 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 379-388

5	Change of variable for the definite integral. Improper integrals. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 55-67 Recommended literature Robert A. Adams, Christopher Essex (2018) Calculus A Complete Course/ Ninth Edition. page 363-382 Gilbert Strang (2023)- Calculus-Wellesley-Cambridge Press. page 856-862
6	Surface area of plane figures. Surface area between two curves. Volume of spherical bodies. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 67-77 Recommended literature Robert A. Adams, Christopher Essex (2018) Calculus A Complete Course/ Ninth Edition. page 296-327, 393-405 Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen, Christopher J. Stocker, (2019) Calculus for Business, Economics, Life Sciences, and Social Sciences/ fourteenth edition. page 421-440
7	Arc length. Applications of the definite integral in economics Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 78-86 Recommended literature Robert A. Adams, Christopher Essex (2018) Calculus A Complete Course/ Ninth Edition. page 406-450 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 524-553
8	Semi-final exam
9	Functions of several variables. Partial derivatives. Implicit derivative. Differential of a function. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 87-103 Recommended literature Ron Larson, Bruce Edwards (2023) Calculus with calcchat and calcview/ twelfth edition. page 872-917 Robert A. Adams, christopher essex (2018) calculus a complete course/ ninth edition. page 678-697 Gilbert Strang (2023)- Calculus-Wellesley-Cambridge press. page 883-906
10	Optimization of functions of several variables. Conditional optimizations. Lagrange Multipliers. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 104-126 Recommended literature Ron Larson, Bruce Edwards (2023) Calculus with calcchat and calcview/ twelfth edition. page 940-970 Robert A. Adams, Christopher essex (2018) calculus a complete course/ ninth edition. page 752-783 Gilbert Strang (2023)- Calculus-Wellesley-Cambridge Press. page 906-823
11	Multiple integrals. Double integrals over rectangles. Double integrals over general regions. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 127-140 Recommended literature Robert A. Adams, Christopher essex (2018) calculus a complete course/ ninth edition. page 815-856 Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen, Christopher J. Stocker, (2019) Calculus for Business, Economics, Life Sciences, and Social Sciences/ fourteenth edition. page 522-550
12	Sequences and convergence. Infinite series. Convergence tests for positive series. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 128-153 Recommended literature Robert A. Adams, Christopher essex (2018) calculus a complete course/ ninth edition. page 500-515 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 674-704
13	The Integral test and estimates of sums. The Comparison tests Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 154-166 Recommended literature Robert A. Adams, Christopher essex (2018) calculus a complete course/ ninth edition. page 531-541 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 723-733
14	Polinomials series. Power series. Representations of functions as power series. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 167-177 Recommended literature Robert A. Adams, Christopher essex (2018) calculus a complete course/ ninth edition. page 531-541 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 723-733
15	Taylor and Maclaurin Series. Applications of Taylor polynomials. Basic literature Adapted lectures in Albanian: Calculus 2. Vladimir Muka page 178-200 Recommended literature Robert A. Adams, Christopher essex (2018) calculus a complete course/ ninth edition. page 542-565 James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition. page 728-758
16	Final Exam

Prerequisites	The student must attend the course at a minimum rate of 75%.
Literature	• Vladimir Muka. Analiza matematike 2
References	• Calculus of a Single Variable 8th Edition-Houghton Mifflin College Div (2006) • Ron Larson, Robert P. Hostetler, Bruce H. Edwards (2011)- Calculus I with Precalculus, 3rd Edition • Larry Joel Goldstein_ David C. Lay_ David I. Schneider_ Nakhlae H Asmar (2017)- Calculus & Its Applications (14th Edition)-Pearso • Robert A. Adams, Christopher Essex (2018) Calculus A Complete Course/ Ninth Edition • Raymond A. Barnett, Michael R. Ziegler, Karl E. Byleen, Christopher J. Stocker, (2019) Calculus for Business, Economics, Life Sciences, and Social Sciences/ fourteenth edition • Edwin "Jed" Herman, Gilbert Strang (2020)- Calculus Volume 1-OpenStax • James Stewart, Daniel Clegg, Saleem Watson (2021) Calculus early transcendentals/ ninth edition • Ron Larson, Bruce Edwards (2023) Calculus with CalcChat and CalcView/ Twelfth Edition • Gilbert Strang (2023)- Calculus-Wellesley-Cambridge Press

Course Outcome

1	Students will be able to understand the main concepts of mathematical analysis related to: the indefinite integral, integration techniques, the definite integral, applications of the definite integral, multivariable functions, partial derivatives, multiple integrals, numerical series, and polynomial series
2	Students will be able to apply in solving exercises and problems related to calculating the surface area of a figure bounded by given graphs, the volume of bodies bounded by function graphs, and the length of arcs.
3	Students will be able to solve problems on function optimization
4	Students will be able to analyze and draw conclusions about the comparison of numerical or polynomial series and transform a given function of one variable into a Taylor or Maclaurin series

Course Evaluation

In-term Studies	Quantity	Percentage
Midterms	1	30
Quizzes	0	0
Projects	0	0
Term Projects	0	0
Laboratory	0	0
Class Participation	1	20
Total in-term evaluation percent		**50**
Final exam percent		**50**
Total		**100**

ECTS Workload (Based on Student Workload)

Activities	Quantity	Duration (hours)	Total (hours)
Course duration (Including the exam week: 16x Total hours of the course)	16	4	64
Study hours outside the classroom (Preparation, Practice, etc.)	14	4	56
Duties	0	0	0
Midterms	1	2	2
Final Exam	1	2	2
Other	1	1	1
Total Work Load			**125**
Total Work Load / 25 (hours)			**5.00**
ECTS			**5.00**