Program	Level	First cycle
	Name of the program	Mathematics Education

COURSE

Course title	**Number Theory**			
Course code	Semester	Course status	ECTS	Contact hours (L+AE+LE)
PMAT 355	VI	Mandatory course	5	2+2+0
Lecturer				
Course Goals	- To master more advanced methods in elementary number theory, in particular, to master the methods of factorizations of integers, as well as the methods required for successful solving of various types of Diophantine equations.			
Learning Outcomes	After successful completion of the module, a student is expected to be able: - to deepen number theory knowledge; - to get to know various methods of factorization and their applications. - to understand primitive roots, index arithmetic, Legendre and Jacobi symbol, multiplicative functions, continued fractions and other important number theory terms; - to comprehend the ways of applications of the adopted methods to factorization of integers and solving nonlinear Diophantine equations.			

COURSE CONTENT

- Pseudoprimes and primality tests.
- Multiplicative functions. Sum and number of divisors. Perfect numbers and Mersenne primes.
- Moebius function. Convolution of multiplicative functions. Moebius inversion theorem.
- Primality tests based on properties of the order of an integer (modulo integer) and the properties of primitive roots.
- Quadratic residues. Legendre and Jacobi symbols and their properties. Quadratic reciprocity and the applications to Diophantine equations.
- Euler pseudoprimes.
- Continued fractions and their properties.
- Methods of factorization based on continued fractions.
- Pythagorean triples and Fermat's last theorem.
- Pell's equation.

LITERATURE

1. Dž. Gušić, *Generalizacije Teorema o ProstimBrojevima*, Prirodno-matematički fakultet Univerziteta u Sarajevu, Sarajevo, 2021.
2. K. H. Rosen, *Elementary number theory and its applications*: *6th edition*, Pearson, 2010.
3. J. J. Tattersall, *Elementary number theory in nine chapters*, Cambridge University Press, 2001.
4. A. A. Gioia, *The theory of numbers, an introduction*, Dover Publications, 2001.
5. T. M. Apostol, *Introduction to analytic number theory*, UTM Springer, 1998.

STUDENT WORKLOAD (hours in a semester)

Lectures	30	Exercises	30	Individual work	65	T o t a l	125

GRADING			**REMARKS**
Criterion	Maximum points	Minimum points	
Midterm exams	100	55	
Final exam	100	55	
T o t a l	100	55	