<table>
<tr><td>COURSE NAME</td><td colspan="5">Algebraic Number Theory</td></tr>
<tr><td>Code</td><td>PMM217</td><td>Year of study</td><td colspan="3">1st and
2nd year of graduate study</td></tr>
<tr><td>Course teacher</td><td>Borka Jadrijević</td><td>Credits (ECTS)</td><td colspan="3">5</td></tr>
<tr><td rowspan="2">Associate teachers</td><td rowspan="2"></td><td rowspan="2">Type of instruction (number of hours)</td><td>L</td><td>S</td><td>E</td></tr>
<tr><td>45</td><td>15</td><td></td></tr>
<tr><td>Status of the course</td><td>Elective course</td><td>Percentage of application of e-learning</td><td colspan="3">30%</td></tr>
<tr><td colspan="6">COURSE DESCRIPTION</td></tr>
<tr><td>Course objectives</td><td colspan="5">Students will acquire basic knowledge in algebraic number theory and the ability to apply that knowledge in solving various problems related to these topics. The course is a good background for understanding and learning more advanced courses in this area.</td></tr>
<tr><td>Prerequisites</td><td colspan="5">Completed courses: Introduction to Number Theory and Algebraic Structures</td></tr>
<tr><td>Learning outcomes expected at the level of the course (4 to 10 learning outcomes)</td><td colspan="5">Upon successful completion of the course, the student is able to:

- define and state some of the main concepts and theorems of algebraic number theory (the problem of unique factorization in the rings of integers of algebraic number fields, unique factorization into ideals, ideal class group, etc.);
- prove basic propositions of the topics listed below;
- apply theoretical knowledge to the investigation of straightforward examples;
- select and apply appropriate methods and techniques to solve problems related to these concepts (compute norms and discriminants, factorize an algebraic integer into irreducibles, factorize ideals into prime ideals, etc.).</td></tr>
<tr><td>Course content broken down in detail by weekly class schedule (syllabus)</td><td colspan="5">- Integral Domains. Irreducibles and primes. Ideals. Maximal ideals and prime ideals. Principal ideal domain. Euclidean domains. (5 hours)
- Noetherian Domains. Noetherian domains. Factorization domains. Unique Factorization domains. Modules. Noetherian modules. (5 hours)
- Elements Integral over a Domain. Elements integral over an integral domain. Integral Closure. (6 hours)
- Algebraic Extensions of a Field. Minimal polynomial. Conjugates of an algebraic number. Simple extensions. Cyclotomic fields. Multiple Extensions. (7 hours)
- Algebraic Number Fields. Algebraic number fields. Ring of integers. Conjugate fields. The field polynomial. Discriminant of an element. Discriminant of a polynomial. Basis of an ideal. Discriminant of an ideal. Prime ideals in rings of integers. Integral Basis. Discriminant of a field. Index. (8 hours)
- Dedekind Domains. Fractional and integral ideals. Unique factorization into prime ideals. Order of an ideal with respect to a prime ideal. Chinese remainder theorem. Norm of an integral ideal. Norm and trace of an element. Norm of a fractional ideal. (8 hours)
- Factoring Primes in a Number Field. Ramification. Discriminant and ramification. Factoring primes in a quadratic field. Factoring primes in an arbitrary number field. Ideal class group. Class number. (6 hours)</td></tr>
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Format of instruction	Lectures, seminar, homework assignments
Student responsibilities	Class attendance is obligatory. Students should present a seminar and solve the homework assignments.
Screening student work *(name the proportion of ECTS credits for each activity so that the total number of ECTS credits is equal to the ECTS value of the course)*	Class attendance (1 ECTS) Homework assignments (1 ECTS) Seminar (1 ECTS) Oral exam (2 ECTS)
Grading and evaluating student work in class and at the final exam	Successful presentations of a seminar and success in solving homework assignments are prerequisites for the oral exam. All parts of the exam are equally weighted in the final grade.
Required literature (available in the library and via other media)	S. Alaca, K. S. Williams: *Introductory Algebraic Number Theory*, Cambridge University Press, 2004. D. A. Marcus, *Number fields*, Springer, New York, 1995;
Optional literature (at the time of submission of study program proposal)	K. Ireland, M. Rosen: *A Classical Introduction to Modern Number Theory*, Springer-Verlag, 1998. P. Samuel, *Algebraic Theory of Numbers*, Hermann, Paris, 1970.
Quality assurance methods that ensure the acquisition of exit competences	Statistics of test results and anonymous student evaluations at the end of the semester according to the regulations of the University of Split.
Other (as the proposer wishes to add)	