



### UČNI NAČRT PREDMETA / SUBJECT SPECIFICATION

<b>Predmet:</b>	Algebraična geometrija
<b>Subject Title:</b>	Algebraic geometry

Študijski program Study programme	Študijska smer Study field	Letnik Year	Semester Semester
Matematika		1	1 ali 2
Mathematics		1	1 or 2

Univerzitetna koda predmeta / University subject code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Labor work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
60					240	10

Nosilec predmeta / Lecturer:

Jeziški / Languages:   
 Predavanja / Vaje / Tutorial:

#### Pogoji za opravljanje študijskih obveznosti:

Poznanje osnovnih pojmov iz algebre in geometrije.

#### Prerequisites:

Knowledge of basic concepts from algebra and geometry.

#### Vsebina:

Algebraična geometrija je veda matematike, ki kombinira metode algebre, predvsem komutativne algebre, z jezikom in problemi geometrije. Veja sedi v centru moderne matematike in ima številne povezave s kompleksno analizo, topologijo in teorijo števil.

Predstavili bomo osnove komutativne algebre (lokalizacija, noetherski kolobarji, primarna dekompozicija, celostna zaprtja) in se nato osredotočili na algebraično geometrijo (ravninske stožnice, krivulje, afine varietete, Hilbertov Nullstellensatz, regularne funkcije na varietetah, projektivne varietete, biracionalna ekvivalenca, tangentni prostori, singularnost, dimenzija,...)

Navedena literatura služi le kot osnova in je nadgrajena z bolj specializiranimi teksti.

#### Content (Syllabus outline):

Algebraic geometry is a branch of mathematics which combines techniques of algebra, mainly commutative algebra, with the language and the problems of geometry. It occupies a central place in modern mathematics and has multiple connections with such diverse fields as complex analysis, topology and number theory.

We will present the basics of commutative algebra (localization, noetherian rings, primary decomposition, integral closure) and then focus on the algebraic geometry (planar conics, curves, affine varieties, Hilbert's Nullstellensatz, regular functions on varieties, projective varieties, birational equivalence, tangent spaces, singularity, dimension ...)

The literature cited generally serves as a base and is being upgraded with more specialized texts.

### Temeljna literatura in viri / Textbooks:

- Michael Atiyah & Ian G. MacDonald (1969), Introduction to Commutative Algebra, Addison-Wesley Publishing
- David Eisenbud (1999), Commutative Algebra With a View Toward Algebraic Geometry, Springer-Verlag,
- Miles Reid (1988). Undergraduate Algebraic Geometry. Cambridge University Press.
- Robin Hartshorne (1997). Algebraic Geometry. Springer-Verlag.
- Oscar Zariski, Pierre Samuel, Pierre (1960) Commutative algebra. Vol. 1, 2., Springer-Verlag.

### Cilji:

- študenta seznaniti z osnovnimi področji komutativne algebre in algebraične geometrije
- pripraviti podlago za poglobljeni študij posebnih področij iz algebre in algebraične geometrije;
- razvijati sposobnosti študenta za samostojno reševanje problemov in razumevanje zahtevnejših matematičnih konceptov.

### Objectives:

- to get students acquainted with fundamental topics of commutative algebra and algebraic geometry;
- to give students a basis for the advanced study of some special topics in algebra and algebraic geometry;
- to develop student's skills for solving problems and understanding deeper mathematical concepts.

### Predvideni študijski rezultati:

#### Znanje in razumevanje:

- poznavanje in razumevanje osnovnih rezultatov komutativne algebre in algebraične geometrije;
- poznavanje algoritmičnih prijemov iz algebre in njihova implementacija..

#### Prenesljive/ključne spretnosti in drugi atributi:

- podlaga za raziskovalno delo na področju algebre in algebraične geometrije;
- prenos in implementacija znanja iz algebre različna strokovna in znanstvena področja, kjer se uporabljajo algebraične metode.

### Intended learning outcomes:

#### Knowledge and understanding:

- knowledge and understanding of basic results of commutative algebra and algebraic geometry;
- knowledge and understanding of basic algorithmic approaches to algebra and their implementations.

#### Transferable/Key Skills and other attributes:

- a basis for research in area of algebra and algebraic geometry;
- implementation and knowledge transfer of statistical methods into different areas dealing with algebraic methods.

### Metode poučevanja in učenja:

- predavanja;
- reševanje praktičnih nalog;
- priprava seminarja;
- konzultacije;
- samostojni študij.

### Teaching and learning methods:

- lectures;
- solving concrete problems;
- seminar work;
- consultations;
- self-study.

### Načini ocenjevanja:

Način (pisni izpit, ustno izpraševanje, naloge, projekt):

- seminarsko predavanje;
- rešitve praktičnih nalog;
- ustni ali pisni izpit.

Delež (v %) /  
Weight (in %)

30 %  
30 %  
40 %

### Assessment methods:

Type (written examination, oral exam, coursework, project):

- seminar talk;
- solutions of concrete problems;
- oral or written examination.