| UČNI NAČRT PREDMETA / COURSE SYLLABUS (leto / year 2016/17) | | | |
|---|---|---|---|
| **Predmet:** | Nekomutativna algebra | | |
| **Course title:** | Noncommutative algebra | | |

| **Študijski program in stopnja**<br>**Study programme and level** | **Študijska smer**<br>**Study field** | **Letnik**<br>**Academic year** | **Semester**<br>**Semester** |
|---|---|---|---|
| Magistrski študijski program Matematika | ni smeri | 1 ali 2 | prvi ali drugi |
| Master's study programme Mathematics | none | 1 or 2 | first or second |

| | |
|---|---|
| **Vrsta predmeta / Course type** | izbirni temeljni / core elective |
| **Univerzitetna koda predmeta / University course code:** | M2211 |

| **Predavanja**<br>**Lectures** | **Seminar**<br>**Seminar** | **Vaje**<br>**Tutorial** | **Klinične vaje**<br>**work** | **Druge oblike študija** | **Samost. delo**<br>**Individ. work** | **ECTS** |
|---|---|---|---|---|---|---|
| **45** | | **30** | | | **105** | **6** |

| | |
|---|---|
| **Nosilec predmeta / Lecturer:** | prof. dr. Matej Brešar, prof. dr. Jakob Cimprič |

| | | |
|---|---|---|
| **Jeziki / Languages:** | **Predavanja / Lectures:** | slovenski / Slovene, angleški / English |
| | **Vaje / Tutorial:** | slovenski / Slovene, angleški / English |

| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** | **Prerequisites:** |
|---|---|
| Vpis v letnik študija. | Enrolment in the programme. |
| **Vsebina:** | **Content (Syllabus outline):** |

| | |
|---|---|
| Nekomutativni obsegi. Frobeniusov izrek. Wedderburnov izrek o končnih obsegih.<br><br>Radikal. Polenostavne algebre. Wedderburnov izrek. Maschkejev izrek.<br><br>Enostavni in polenostavni moduli. Izrek o gostoti. Jacobsonov radikal.<br><br>Tenzorski produkti algeber. Skolem-Noetherin izrek. Izrek o drugem centralizatorju. Brauerjeva grupa. | Noncommutative division rings. Frobenius' theorem. Wedderburn's theorem on finite divison rings.<br>Radical. Semisimple algebras. Wedderburn's theorem. Maschke's theorem.<br><br>Simple and semisimple modules. Density theorem. Jacobson radical.<br><br>Tensor product of algebras. Skolem-Noether theorem. Double centralizer theorem. Brauer group. |

**Temeljni literatura in viri / Readings:**

R. K. Dennis, B. Farb, Noncommutative algebra, Springer, 1993.

T. Y. Lam, A first course in noncommutative rings, Springer, 2001.

R. S. Pierce, Associative algebras, Springer, 1982.

L. Rowen, Graduate algebra: Noncommutative view, AMS, 2008.

M. Brešar, Introduction to Noncommutative Algebra, Springer, 2014

| **Cilji in kompetence:** | **Objectives and competences:** |
|---|---|
| Spoznati osnovne pojme in orodja nekomutativne algebre. | To master basic concepts and tools of noncommutative algebra. |

| **Predvideni študijski rezultati:** | **Intended learning outcomes:** |
|---|---|
| Znanje in razumevanje:<br><br>Razumevanje osnovnih pojmov in izrekov nekomutativne algebre ter njihove vloge na nekaterih drugih področjih.<br><br>Uporaba:<br><br>V drugih vejah matematike. | Knowledge and understanding:<br><br>Understanding of basic concepts and theorems of noncommutative algebra, and their role in some other areas.<br><br>Application:<br><br>In other mathematical areas. |

| Refleksija: | Reflection: |
|---|---|
| Razumevanje teorije na podlagi primerov in uporabe.<br><br>Prenosljive spretnosti – niso vezane le na en predmet:<br><br>Formulacija in reševanje problemov z abstraktnimi metodami. | Understanding the theory on the basis of examples and applications.<br><br>Transferable skills:<br><br>Formulation and solution of problems using abstract methods. |

| **Metode poučevanja in učenja:** | **Learning and teaching methods:** |
|---|---|
| Predavanja, vaje, domače naloge, konzultacije. | Lectures, exercises, homeworks, consultations. |

| **Načini ocenjevanja:** | Delež (v %) / Weight (in %) | **Assessment:** |
|---|---|---|
| Način (pisni izpit, ustno izpraševanje, naloge, projekt):<br><br>domače naloge<br><br>ustni izpit<br><br>Ocene: 1-5 (negativno), 6-10 (pozitivno) (po Statutu UL) | <br><br><br><br>50%<br><br>50% | Type (examination, oral, coursework, project):<br><br>homework assignment<br><br>oral exam<br><br>Grading: 1-5 (fail), 6-10 (pass) (according to the Statute of UL) |

**Reference nosilca / Lecturer's references:**

Matej Brešar:

BREŠAR, Matej, CHEBOTAR, M. A., MARTINDALE, Wallace S. Functional identities, (Frontiers in mathematics). Basel, Boston, Berlin: Birkhäuser, cop. 2007. XII, 272 str. ISBN 978-3-7643-7795-3. ISBN 978-3-7643-7796-0. [COBISS.SI-ID 14332505]

BREŠAR, Matej. An elementary approach to Wedderburn's structure theory. Expositiones mathematicae, ISSN 0723-0869, 2010, vol. 28, no 1, str. 79-83. [COBISS.SI-ID 15382617]

BREŠAR, Matej. An alternative approach to the structure theory of PI-rings. Expositiones mathematicae, ISSN 0723-0869, 2011, vol. 29, no 1, str. 159-164. [COBISS.SI-ID 15859545]

Jaka Cimprič:

CIMPRIČ, Jaka. Free skew fields have many [ast]-orderings. Journal of algebra, ISSN 0021-8693, 2004, vol. 280, no. 1, str. 20-28. [COBISS.SI-ID 13210201]

CIMPRIČ, Jaka. Formally real involutions on central simple algebras. Communications in algebra, ISSN 0092-7872, 2008, vol. 36, no. 1, str. 165-178. [COBISS.SI-ID 14613337]

CIMPRIČ, Jaka, HELTON, J. William, MCCULLOUGH, Scott, NELSON, Christopher. A noncommutative real nullstellensatz corresponds to a noncommutative real ideal: algorithms. Proceedings of the London Mathematical Society, ISSN 0024-6115, 2013, vol. 106, iss. 5, str. 1060-1086. [COBISS.SI-ID 16636249]