



Univerza v Mariboru

Fakulteta za naravoslovje
in matematiko

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Didaktika osnovnošolske matematike
Course title:	Didactics of Elementary School Mathematics

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Izobraževalna matematika – enopredmetna, 2. Stopnja		1.	1.
Educational mathematics - single- major, 2 nd cycle		1.	1.

Vrsta predmeta / Course type Obvezen/Compulsory

Univerzitetna koda predmeta / University course code:

Predavanja Lectures	Seminar Seminar	Sem. vaje Tutorial	Lab. vaje Laboratory work	Teren. vaje Field work	Samost. delo Individ. work	ECTS
45		45			120	7

Nosilec predmeta / Lecturer: Alenka LIPOVEC

Jeziki / Predavanja / Lectures: SLOVENSKO/SLOVENE
Languages: Vaje / Tutorial: SLOVENSKO/SLOVENE

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Ni pogojev.

Prerequisites:

There are no prerequisites.

Vsebina:

- Didaktika matematike kot znanosti, mednarodne raziskave. Aktualni izzivi in dileme na področju pouka osnovnošolske matematike.
- Temeljni pojmi didaktike matematike: cilji pouka matematike, razumevanje, tipi in taksonomija matematičnega znanja, reprezentacije matematičnih pojmov, teorije učenja in teorije motivacije, problemsko učenje, realistična matematika, ponazorila.
- Didaktični elementi izvajanja pouka matematike (oblike in metode dela, didaktična načela, pisna priprava, učna gradiva ...) in didaktično načrtovanje vzgojno-izobraževalnega procesa (dolgoročno in kratkoročno).

Content (Syllabus outline):

- Mathematics education as science, international surveys. Contemporary challenges and dilemmas in teaching elementary mathematics.
- Fundamental concepts of mathematics education: goals of school mathematics, understanding, types and taxonomy of mathematical knowledge, representation of mathematical concepts, learning and motivation theories, problem-based learning, RME, manipulatives.
- Didactic elements of mathematics education (forms and methods of instruction, didactic principles, lesson planning model, educational references and resources ...), and planning of the -Mathematics curriculum in elementary

- Učni načrt za matematiko v osnovni šoli. Izbrane vsebine osnovnošolske matematike.
- Princip enakosti, otroci s posebnimi potrebami. Diferenciacija, personifikacija in igrifikacija v osnovni šoli. Pomen in uporaba tehnologije (IKT) ter e-učenja pri pouku osnovnošolske matematike.
- Nadarjeni učenci in njihovimi starši, krožek, tekmovanja, poletne šole.
- Vrednotenje znanja v osnovni šoli.

- school. Selected contents of elementary school mathematics.
- Equity principle, children with special needs. Differentiation, personification and gamification in elementary school. Technology (ICT) and e-learning for enhancing mathematics instruction.
- Talented students and their parents, math club, competitions, summer schools.
- Assessment in elementary school.

Temeljna literatura in viri / Readings:

1. Van de Walle, J. A., Karp, K. S., Bay-Williams, J. M. (2015). *Elementary and middle school mathematics. Teaching Developmentally*. Boston [etc.]: Pearson
2. Kmetič, S., Frobisher, L. (1996). *Izzivi za mlade matematike : izzivi za učence, učitelje in starše*. Maribor: Obzorja.
3. Aktualni periodični viri , učni načrt in literatura.

Cilji in kompetence:

Namen predmeta je študente usposobiti za uporabo principov didaktike matematike, ki jih potrebujejo za uspešno poučevanje matematike v osnovni šoli. Dodatno poudarjeno je delo z matematično obetavnimi učenci.

Študent/ka:

- izkazuje suveren in kritičen odnos do šolske matematike,
- uporablja logično zaporedje, ki modelira strategije reševanja problemov pri pouku matematike,
- načrtuje razvoj matematičnega znanja pri pouku,
- uporablja tehnologijo pri pouku matematike,
- prepozna učne težave, ki so posledica večjezičnosti, multikulturalnosti, prikrajšanosti, idr.,
- evalvira lastno poučevanje matematike.

Objectives and competences:

The course aims are to train students in the application of the principles of mathematics didactics, which they need for successful mathematics teaching in elementary school. Additionally, the emphasis is on work with mathematically promising students.

Students:

- demonstrate sovereign and critical attitude towards school mathematics,
- apply a logical sequence of problem-solving strategies in classrooms,
- plan to develop mathematical knowledge in classes,
- use technology in school mathematics,
- recognise the learning difficulties as a result of multilingualism, multiculturalism, deprivation, et al.,
- evaluate himself as a teacher of mathematics.

Predvideni študijski rezultati:

Znanje in razumevanje:

Po zaključku tega predmeta bo študent sposoben:

- povezovati in pri pouku uporabljati temeljna in sodobna načela didaktike matematike,
- presoјati primerne aktivnosti in vire za pouk matematike,

Intended learning outcomes:

Knowledge and understanding:

On completion of this course, the student will be able to:

- connect and apply fundamental and contemporary mathematical education principles in school settings,
- evaluate appropriate activities and resources for mathematics instructions,

<ul style="list-style-type: none"> - uporabljati temeljne pojme didaktike matematike (reprezentacije, tipi znanja, taksonomija) v realnih situacijah, - pojasniti zgradbo učnega načrta za matematiko, - uporabljati tehnologijo pri pouku matematike na osmišljen in učinkovit način, - ustvariti metodično sekvenco za matematične pojme, ki se razvijajo v osnovni šoli, - načrtovati vključevanje kognitivnega konflikta v metodične sekvence, - klasificirati pristope glede na teme in sklope v učnem načrtu, - izpostaviti temeljne ideje vsebinskih sklopov, - izdelati vrednotenja znanja za pouk matematike, - razviti in izvesti timski pouk matematike, - načrtovati in izvesti nekatere oblike dela z nadarjenimi učenci. - reflektirati in samoevalvirati učinkovitost lastnega poučevanja matematike. <p>Prenosljive/ključne spretnosti in drugi atributi:</p> <ul style="list-style-type: none"> - <i>Spretnosti komuniciranja</i>: ustna in pisna matematična komunikacija, ki sledi splošnim jezikovnim normam. - <i>Uporaba informacijske tehnologije</i>: uporaba programskih orodij in aplikacij pri pouku matematike - <i>Reševanje problemov</i>: sposobnost reševanja izobraževalno matematičnih problemov. - <i>Računska pismenost</i>: reševanje šolskih matematičnih problemov. - <i>Delo v skupini</i>: priprava in izvedba timskega pouka. 	<ul style="list-style-type: none"> - apply the basic concepts in didactics of mathematics (representations, types of knowledge, taxonomy) in real situations, - explain the structure of the math curriculum, - use ICT in mathematics education in a meaningful and efficient way, - create a teaching sequence for mathematical concepts taught at the elementary level, - plan integration of cognitive conflicts into methodological processes - classify approaches according to the themes and content sections in the mathematics curriculum, - emphasise the basic ideas of the content sections, - design knowledge assessments for math, - develop and implement team instructions in mathematics classrooms, - design and apply some forms of work with talented students, - self-evaluate the effectiveness of mathematics teaching. <p>Transferable/Key Skills and other attributes:</p> <ul style="list-style-type: none"> - <i>Communication skills</i>: oral and written mathematical communication that complies with general language norms. - <i>Use of information technology</i>: the use of software tools and applications in mathematics. - <i>Problem-solving</i>: ability to solve educational problems in school mathematics. - <i>Numeracy</i>: solving school mathematical problems. - <i>Teamwork</i>: designing and carrying out collaborative lessons.
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Metode poučevanja in učenja:

<ul style="list-style-type: none"> - visokošolska predavanja, - metoda razgovora, - metoda reševanja problemov, - sodelovalno učenje, - projektno delo. - delo z viri. <p>Poučevanje in učenje potekata z didaktično uporabo informacijsko-komunikacijske tehnologije.</p>
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Learning and teaching methods:

<ul style="list-style-type: none"> - lectures, - Socratic method, - problem-solving, - cooperative learning, - project work, - work with resources. <p>Teaching and learning are done through the didactic use of ICT.</p>
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Načini ocenjevanja:	Delež (v %) / Weight (in %)	Assessment:
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<p>Način (pisni izpit, ustno izpraševanje, naloge, projekt):</p> <ul style="list-style-type: none"> - pisni test, - mikronastop pred kolegi študenti, - portfolij. <p>Vsaka izmed naštetih obveznosti mora biti opravljena s pozitivno oceno.</p>	<p>50%</p> <p>10%</p> <p>40%</p>	<p>Type (examination, oral, coursework, project):</p> <ul style="list-style-type: none"> - written test, - microteaching, - portfolio. <p>Each of the listed obligations must be assessed with passing grade.</p>
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Reference nosilca / Lecturer's references:

1. ANTOLIN DREŠAR, Darja, LIPOVEC, Alenka. Mathematical experiences and parental involvement of parents who are and who are not mathematicians. *Irish educational studies*, ISSN 0332-3315, 2017, vol. 36, no. 3, str. 357-374, doi: [10.1080/03323315.2017.1333445](https://doi.org/10.1080/03323315.2017.1333445).
2. LIPOVEC, Alenka, FERME, Jasmina. Some factors influencing effectiveness of mathematics homework. V: ROGERSON, Alan (ur.). *The mathematics education for the future project : proceedings of the 15th International Conference Theory and Practice: an Interface or a Great Divide?, 4-9 Aug, 2019, Maynooth University, Kildare, Ireland*. Münster: WTM, Verlag für wissenschaftliche Texte und Medien, cop. 2019. Str. 330-335. Conference proceedings in mathematics education, Bd. 4. ISBN 978-3-95987-111-2.
3. LIPOVEC, Alenka, FERME, Jasmina. Reflections of future teachers of lower elementary grades on performed mathematics lessons. V: MILINKOVIĆ, Jasmina (ur.), KADELBURG, Zoran (ur.). *Scientific Conference "Research in Mathematics Education" : proceedings : Mathematical Society of Serbia, Belgrade : Serbia, May 10 - 11, 2019*. Scientific Conference "Research in Mathematics Education", Belgrade, Serbia May 10 - 11, 2019. Belgrade: Mathematical Society of Serbia, 2019. Str. 40-52, tabele. ISBN 978-86-6447-017-9. <https://dms.rs/wp-content/uploads/2019/12/Zbornik-ERME.pdf>.
4. LIPOVEC, Alenka, ZMAZEK, Jan, LAH, Vid, ZMAZEK, Eva, ZMAZEK, Blaž. Z generation students' learning mathematics with e-resources. *International journal of education and information technologies*, ISSN 2074-1316, 2017, vol. 11, str. 105-110. www.naun.org/main/NAUN/educationinformation/2017/a302008-037.pdf
5. SABO, Mateja, LIPOVEC, Alenka. Stavovi hrvatskih i slovenskih učitelja o razlikama među kurikularnim matematičkim sadržajima. *Matematika i škola*, ISSN 1332-0327, 2017, god. 18, br. 89, str. 177-182.