Syllabus

Kursbeschreibung

Titel der Lehrveranstaltung	Didaktik der Mathematik und Naturwissenschaften 2 - Inhaltliche Vertiefung
Code der Lehrveranstaltung	11422
Zusätzlicher Titel der Lehrveranstaltung	
Wissenschaftlich-disziplinärer Bereich	NN
Sprache	Italienisch
Studiengang	Einstufiger Master in Bildungswissenschaften für den Primarbereich - Abteilung in italienischer Sprache
Andere Studiengänge (gem. Lehrveranstaltung)	
Dozenten/Dozentinnen	Prof. Federico Corni, Federico.Corni@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/800 Prof. a contratto dr. Leonardo Colletti, Leonardo.Colletti@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/3425 dr. Sara Bagossi, Sara.Bagossi@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/50774
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
Studienjahr/e	4.
KP	10
Vorlesungsstunden	70
Laboratoriumsstunden	50

Stunden für individuelles Studium	130
Vorgesehene Sprechzeiten	30
Inhaltsangabe	Knowledge of the main constructs of mathematics didactics
Themen der Lehrveranstaltung	Knowledge of the fundamental elements of planning a teaching activity and the main collections of teaching experiences in mathematics Critical knowledge of the fundamental elements of teaching physical sciences in pre-school and primary school as set out in the Provincial Directions of the Autonomous Province of Bozen/Bolzano, the National Directions for the Curriculum and the PAT Guidelines. Knowledge of the fundamental elements of planning interdisciplinary teaching activities and teaching experiences in the physical sciences. Capacity Ability to design a teaching-learning pathway in mathematics adapting to the context situation Ability to formatively evaluate learning in mathematics Ability to read and interpret everyday life situations in scientific terms Ability to find, criticise, use, modify and develop materials for work in situations involving the physical sciences. Ability to design interdisciplinary teaching/learning paths in physical sciences adapting to the context situation.
Stichwörter	Systems thinking. Teaching physics to children aged 5-12. Energy and energy sources. Forces of nature. Astronomy.
Empfohlene Voraussetzungen	
Propädeutische Lehrveranstaltungen	
Unterrichtsform	Interactive lectures with games, exercises, and simple experiments from the lectern. Group laboratory experiences with final report. Preparation of learning units.
Anwesenheitspflicht	In accordance with the regulation
Spezifische Bildungsziele und erwartete	Disciplinary skills Knowledge and understanding

Lernergebnisse	Educational knowledge relating to mathematics and physics in pre-school and primary school, with attention to interdisciplinary links. Knowledge of the main factors of disorder, discomfort and difficulty in learning mathematics (dyscalculia, dysgraphia, ...) Knowledge of the main theoretical constructs of mathematics didactics (didactic contract, epistemological obstacle, cognitive unity between arguing and demonstrating, collective discussion, ...) Knowledge of the main characteristics from a disciplinary point of view of the main standardised surveys Knowledge of group dynamics during children's mathematical activity. Knowledge of the main natural conceptualisations in the interpretation of physical reality and their development in the direction of a scientific approach to reality. Ability to apply knowledge and understanding: Design learning paths in mathematics and physics. Analysing teaching situations, pupil protocols, standardised test questions, parts of textbooks. Analysing an artefact for learning-teaching mathematics in pre-school and primary school. Analysing a textbook or teaching proposal made by others. Search for material to construct a didactic path in relation to a learning objective. Set up learning environments appropriate to the age of the learners Prepare inclusive learning environments with respect to pupils with disabilities, specific learning disorders, difficulties. Transversal/soft skills Autonomy of judgement: Recognise the validity of teaching paths in mathematics and physics observed during the placement, in textbooks, manuals and teaching guides Recognise the validity of materials on the Internet Critically analyse and evaluate student protocols (papers, films) and class discussions Communication skills:

	Presenting a teaching project. Present an analysis of teaching paths or textbooks or tests. Communicate and share resources with colleagues both orally and online. Make appropriate use of digital technologies to communicate in class and with colleagues and to document Manage learning situations in multilingual contexts Learning skills: Acquire the ability to learn from one's environment by analysing materials, documentation, protocols and standardised assessment results.
Spezifisches Bildungsziel und erwartete Lernergebnisse (zusätzliche Informationen)	
Art der Prüfung	MATHEMATICS: Written and project teaching Written with verification of the ability to analyse and design teaching situations using materials critically Teaching project carried out in a group with an application paper PHYSICS: Oral with discussion of materials produced individually and in groups and questions on all topics covered in the lecture. The module mark is composed of the marks of the individual parts (lectures and mathematics laboratory, lectures and physics laboratory) weighted against the relevant number of CFUs. The four parts must be passed individually with a mark of no less than 60%. In the event of a failing grade for the entire module, any parts successfully passed will be considered as already passed on the next attempt to take the entire module examination. It should be borne in mind that, even in this case, a negative mark for the entire module will be counted towards the number of attempts available to take an examination. According to the Examinations Regulations, if a student fails an examination in three consecutive attempts, he/she may not register for the same examination in the three sessions following the last attempt (Art. 6, para. 4 of the current Regulations for Proficiency Examinations).
Bewertungskriterien	MATHEMATICS:

	Written test and laboratory project work: Analysis of protocols and materials. Design of teaching situations. In the written exam, students will be asked to be familiar with the Provincial Indications and the relationship between these and the National Indications for the first cycle of education of the Italian Republic; to critically master their contents in teaching and learning situations; to adequately use theoretical constructs to analyse classroom situations, teaching materials, students' protocols, survey and assessment results. In the project work, students are expected to demonstrate their ability to apply the acquired notions and to be able to present and defend their work. Assessment criteria: knowledge of the required content, logical structure, clarity and coherence of argument, formal and linguistic correctness. PHYSICS: Oral examination - discussion of course content and materials produced. In the materials produced and handed in prior to the call, students must show that they are able to apply the acquired notions and that they are able to present and defend their work. Assessment criteria: knowledge of the content covered in class, logical structure, clarity and coherence of argument, formal and linguistic correctness. The written examination in Mathematics counts 4/10 in the final grade; the laboratory project work in Mathematics 2/10; the oral examination in Physics 2/10 and the materials produced in the Physics laboratory 2/10.
Pflichtliteratur	Zan, R. (2007). *Difficoltà in matematica. Osservare, interpretare, intervenire*. Milano: Springer Verlag Arzarello, F., Bazzini L., Ferrara F., Sabena C., Andrà C., Merlo D., Savioli K. and Villa B. (2011). *Matematica: non è solo questione di testa. Strumenti per* osservare i processi in classe. Trento: Erickson. Fuchs, HU., Corni, F. (2023). Primary Physical Science Education. An imaginative approach to encounters with nature. Springer, Open Access.

	Egan, K. (2012). La comprensione multipla. Sviluppare una mente somatica, mitica, romantica, filosofica e ironica. Erickson. .
Weiterführende Literatur	Other materials including handouts will be made available to students in the Reserve Collection, OLE or Teams.
Weitere Informationen	
Ziele für nachhaltige Entwicklung (SDGs)	Hochwertige Bildung, Geschlechter-Gleichheit, Bezahlbare und saubere Energie, Maßnahmen zum Klimaschutz, Nachhaltige Städte und Gemeinden, Nachhaltiger Konsum und Produktion, Weniger Ungleichheiten

Kursmodul

Titel des Bestandteils der Lehrveranstaltung	Didaktik der Mathematik: inhaltliche Vertiefungen
Code der Lehrveranstaltung	11422A
Wissenschaftlich-disziplinärer Bereich	MATH-01/B
Sprache	Italienisch
Dozenten/Dozentinnen	dr. Sara Bagossi, Sara.Bagossi@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/50774
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
KP	4
Verantwortliche/r Dozent/in	
Vorlesungsstunden	40
Laboratoriumsstunden	0
Stunden für individuelles Studium	60
Vorgesehene Sprechzeiten	12
Inhaltsangabe	In Teaching Mathematics Didactics: Thematic Insights, the main

	constructs of mathematics didactics will be presented in situ, with the aim of learning how to use them when planning and teaching action and interpreting pupils' behaviour.
Themen der Lehrveranstaltung	Institutional context: analysis of the National and Provincial Guidelines; content scanning. Mathematics laboratory: the meaning of the mathematics laboratory in the National and Provincial Guidelines. The teacher's role in laboratory activities. Examples of teaching activities with artefacts. Problem posing and problem solving: problem solving in mathematics education. Mathematical modelling: the modelling cycle. Didactic constructs: didactic transposition, didactic contract, misconceptions, prototypes. Design elements of educational activities: definition of objectives; use of artefacts; working methodologies in the classroom; mathematical discussion; textbooks and repositories of materials. Impact of technologies: use of digital platforms and tools for learning and design. Assessment: the different forms of assessment (formative and summative). The INVALSI standardised tests.
Unterrichtsform	Lectures, case discussions, group analysis of activities, use of and design with digital tools.
Pflichtliteratur	Sabena, C., Ferri, F., Martignone, F. & Robotti, E. (2019). *Insegnare e apprendere matematica nella scuola dell'infanzia e primaria.* Milano: Mondadori.
Weiterführende Literatur	

Kursmodul

Titel des Bestandteils der Lehrveranstaltung	Didaktik der Mathematik mit besonderer Berücksichtigung der Altersstufe 5-12 (Lab.)
Code der Lehrveranstaltung	11422B
Wissenschaftlich-disziplinärer Bereich	MATH-01/B
Sprache	Italienisch
Dozenten/Dozentinnen	dr. Sara Bagossi, Sara.Bagossi@unibz.it

	https://www.unibz.it/en/faculties/education/academic-staff/person/50774 Prof. George Richard Paul Santi, GeorgeRichardPaul.Santi@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/39717
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
KP	2
Verantwortliche/r Dozent/in	
Vorlesungsstunden	0
Laboratoriumsstunden	30 Gruppo 1,2: dr. Sara Bagossi Gruppo 3: Prof. George Richard Paul Santi
Stunden für individuelles Studium	20
Vorgesehene Sprechzeiten	6
Inhaltsangabe	The workshop Teaching mathematics with a focus on the 5-12 age group includes the realisation and group presentation of a mathematics teaching project for primary school, with a focus on vertical continuity with pre-school and secondary school
Themen der Lehrveranstaltung	List of topics: Elaboration of a teaching project with reference to sources, analysis of materials, construction of evaluation tests with reference to the core themes of the National Curriculum Guidelines
Unterrichtsform	Workshop
Pflichtliteratur	Sabena, C., Ferri, F., Martignone, F. & Robotti, E. (2019). *Insegnare e apprendere matematica nella scuola dell'infanzia e primaria.* Milano: Mondadori.
Weiterführende Literatur	

Kursmodul

Titel des Bestandteils der Lehrveranstaltung	Didaktik der Physik: inhaltliche Vertiefungen
Code der Lehrveranstaltung	11422C

Wissenschaftlich-disziplinärer Bereich	PHYS-06/B
Sprache	Italienisch
Dozenten/Dozentinnen	Prof. Federico Corni, Federico.Corni@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/800
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
KP	2
Verantwortliche/r Dozent/in	
Vorlesungsstunden	30
Laboratoriumsstunden	0
Stunden für individuelles Studium	20
Vorgesehene Sprechzeiten	6
Inhaltsangabe	In the teaching of Didactics of Physics: Thematic Insights, the main disciplinary contents of physics will be presented and some of the thematic insights that pupils will encounter in kindergarten and primary school will be addressed, with a focus on the didactic aspects involved.
Themen der Lehrveranstaltung	Reference to Provincial Indications and National Indications. Narrative and analogical approach to various levels of formalisation of contexts such as fluids, thermal phenomena, electricity and motion. Introduction to the concept of energy. Understanding and cognitive tools. Dynamic modelling, dynamic systems, complexity. Analysis of some complex systems of interest to the school. Systems thinking.
Unterrichtsform	Lectures, classroom experiences, case discussions
Pflichtliteratur	Fuchs, HU., Corni, F. (2023). Primary Physical Science Education. An imaginative approach to encounters with nature. Springer, Open Access. Egan, K. (2012). La comprensione multipla. Sviluppare una mente somatica, mitica, romantica, filosofica e ironica. Erickson.

Weiterführende Literatur	

Kursmodul

Titel des Bestandteils der Lehrveranstaltung	Didaktik der Physik mit besonderer Berücksichtigung der Altersstufe 5-12 (Lab.)
Code der Lehrveranstaltung	11422D
Wissenschaftlich-disziplinärer Bereich	PHYS-06/B
Sprache	Italienisch
Dozenten/Dozentinnen	Prof. Federico Corni, Federico.Corni@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/800 Prof. a contratto dr. Leonardo Colletti, Leonardo.Colletti@unibz.it https://www.unibz.it/en/faculties/education/academic-staff/person/3425
Wissensch. Mitarbeiter/Mitarbeiterin	
Semester	Erstes Semester
KP	2
Verantwortliche/r Dozent/in	
Vorlesungsstunden	0
Laboratoriumsstunden	20 Gruppo 1 e 2: Prof. Corni Federico Gruppo 3: Dr. Colletti Leonardo
Stunden für individuelles Studium	30
Vorgesehene Sprechzeiten	6
Inhaltsangabe	Workshop on the production and discussion of teaching-learning activities in the physical sciences for the 5-12 age group with reference to the content covered in the lecture.
Themen der Lehrveranstaltung	Didactic activities for interdisciplinary teaching-learning in the physical sciences (e.g. experiences with fluids, heat and electricity, discussions, creative activities, motor activities, dramatisation, role-playing, games, reading and writing, singing, etc.).

Unterrichtsform	Workshop with group activities and preparation of materials.
Pflichtliteratur	Fuchs, HU., Corni, F. (2023). Primary Physical Science Education. An imaginative approach to encounters with nature. Springer, Open Access. Egan, K. (2012). La comprensione multipla. Sviluppare una mente somatica, mitica, romantica, filosofica e ironica. Erickson.
Weiterführende Literatur	