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| **UČNI NAČRT PREDMETA / COURSE SYLLABUS** |
| **Predmet:** | **D114: Category Theory and Philosophical Dialectics** |
| **Course title:** | **D114: Category Theory and Philosophical Dialectics** |
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| **Študijski program in stopnja****Study programme and level** | **Študijska smer****Study field** | **Letnik****Academic year** | **Semester****Semester** |
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| **Vrsta predmeta / Course type** | Optional/Elective |
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| **Univerzitetna koda predmeta / University course code:** |  |
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| **Predavanja****Lectures** | **Seminar****Seminar** | **Vaje****Tutorial** | **Klinične vaje****work** | **Druge oblike študija** | **Samost. delo****Individ. work** |  | **ECTS** |
| **20** | **20** | **20** |  |  | **90** |  | **5** |
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| **Nosilec predmeta / Lecturer:** | **Prof. Rocco Gangle** |
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| **Jeziki /** **Languages: S/A** | **Predavanja / Lectures:** | **English** |
| **Vaje / Tutorial:** |  |
| **Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:** |  | **Prerequisits:** |
|  |  | Mandatory active participation in lectures, active participation in discussions, especially in seminar discussions; Presentation of seminar works. The progression of students will be evaluated on an ongoing basis through assessment of shorter seminar works. Final seminar work and discussion: the final research assignment will be oriented towards ultimate publication in a scientific or professional journal. |
| **Vsebina:**  |  | **Content (Syllabus outline):** |
|  |  | This course explores the philosophical meaning and relevance of category theory, a branch of contemporary mathematics with deep and far-ranging connections to practically all mathematical fields as well as the natural and social sciences and, most importantly and least recognized, fundamental philosophical concepts and methods. The course introduces the basic formalism and core techniques of category theory and builds up to elementary study of adjoint functors and topoi. Topics to be covered include the relation between axiom systems and models, fixed-point theorems and their connection with Godelian incompleteness proofs, the difference between Boolean and non-Boolean Heyting algebras, and Yoneda's lemma. These mathematical constructions and their logical ramifications are studied concurrently with an examination of Hegel's dialectical logic as presented in its fullest, mature form in *The Science of Logic*, following the guiding thread of such pioneering philosophers as Cavaillès and Lautman, for whom mathematics remains an ineluctable element of any truly dialectical thinking.The seminar will proceed by advancing through Lawvere and Schanuel's extraordinarily clear and accessible introductory text to category theory (see below) while at the same time investigating a variety of philosophers who have examined the importance of foundational mathematics (set theory and category theory) for contemporary philosophy, including Badiou, Rodin, Zalamea and Priest. Our focus throughout is on the immanently dialectical structure of categories, that is to say, the core method whereby they »lift« objects of inquiry to determination purely through structural relations and then further from systems of relations to systems of meta-relations.As we work through the category theoretical mathematics and explore its transformative effects on contemporary philosophy, we will continually pursue our close reading of the *Science of Logic*, a core text of the post-Kantian tradition, as guided by the commentaries and analyses of Hyppolite and Rosen and with constant reference to the formal expression of immanent logic within categories and topoi. |

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| **Temeljni literatura in viri (domača in tuja) / Readings:** |
| Badiou, Alain, *Logics of Worlds*. Trans. Alberto Toscano. London: Bloomsbury, 2009 (extracts).Badiou, Alain, *Mathematics of the Transcendental*. Trans. A.J. Bartlett and Alex Ling. London: Bloomsbury, 2014 (extracts).Cavaillès, Jean, »On Logic and the Theory of Science«. Trans. T Kisiel in *Phenomenology and the Natural Sciences: Essays and Translations,* ed. J Kockelmans & T Kisiel. Evanston, IL: Northwestern University Press, 1970, pp. 353-409.Hegel, G.W.F., trans., *The Science of Logic*. Trans. A.V. Miller. Amherst, NY: Prometheus Books, 1991.Hyppolite, *Logic and Existence*. Trans. Leonard Lawlor and Amit Sen. Albany, NY: SUNY Press, 1997.Lautman, Albert, *Mathematics, Ideas and the Physical Real*. Trans. Simon Duffy. New York and London: Continuum, 2011.Lawvere, William and Stephen Schanuel, *Conceptual Mathematics: A First Introduction to Categories*. 2nd ed. Cambridge: Cambridge University Press, 2009.Priest, Graham, *Beyond the Limits of Thought*. Oxford and New York: Oxford University Press, 2002.Rodin, Andrei, *Axiomatic Method and Category Theory*. Dordrecht: Springer Press, 2013.Rosen, Stanley, *The Idea of Hegel's »Science of Logic«*. Chicago: University of Chicago Press, 2014.Zalamea, Fernando, *Synthetic Philosophy of Contemporary Mathematics*. London and New York: Urbanomic/Sequence, 2013.**Priporočljiva literatura in viri:**  |
| **Cilji in kompetence:** |  | **Objectives and competences:** |
|  |  | * Develop a basic competency in the mathematical methods and techniques of category theory and understand their philosophical relevance.
* Articulate core philosophical structures such as self-reference, intentionality, dialectic and chiasmic implication in a rigorous formal manner with the tools of category theory and topoi.
* Understand and apply Hegelian dialectical logic in a variety of social, political and historical interpretative contexts.
* Compose a well-structured philosophical essay that integrates formal methodologies and more conventionally philosophical conceptual argumentation.
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| **Predvideni študijski rezultati:** |  | **Intended learning outcomes:** |
|  |  | * Develop a basic competency in the mathematical methods and techniques of category theory and understand their philosophical relevance.
* Articulate core philosophical structures such as self-reference, intentionality, dialectic and chiasmic implication in a rigorous formal manner.
* Understand and apply Hegelian dialectical logic in a variety of social, political and historical interpretative contexts.
* Compose a well-structured philosophical essay that integrates formal methodologies and conceptual argumentation in ordinary language.
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| **Metode poučevanja in učenja:** |  | **Learning and teaching methods:** |
|  |  | Lectures, interactive learning, seminars, exercises in formal proof, discussions, close textual analysis, group work and individual reading and study. |
| **Načini ocenjevanja:** | Delež (v %) /Weight (in %) | **Assessment:** |
| 80%20% | **100 %** | **Written Assignments****Oral Exam** |
| **Reference nosilca / Lecturer's references:**  |
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