

COURSE DESCRIPTION

Course name	Hilbert scheme of points
Course type	reading course (wrd)
Supervisor	Jarosław Buczyński
ECTS credit allocation	4 – IM PAN Ph. D. program; 6 - recommended for MA programs
Duration	One semester
Number of hours	30
Language	English or Polish, if every participant speaks Polish
Prerequisites	Algebraic Geometry, Algebra II (Commutative Algebra)
Course content	<p>1) basic examples of schemes in algebraic geometry, how they arise naturally</p> <p>2) theoretical aspects of schemes – formal definitions, coherent sheaves, first properties.</p> <p>3) Definition and properties of Hilbert scheme</p> <p>4) Hilbert scheme of points, examples when it is irreducible, and examples when it is not.</p>
Recommended reading	<p>[1] R. Hartshorne „Algebraic Geometry”, Chapter II</p> <p>[2] D. Eisenbud, J. Harris „Geometry of Schemes”</p> <p>[3] Dustin A. Cartwright, Daniel Erman, Mauricio Velasco, and Bianca Viray. „Hilbert schemes of 8 points”. Algebra Number Theory, 3(7):763–795, 2009.</p>
Learning outcomes	<p>The student:</p> <ol style="list-style-type: none"> 1. is familiar with the notions of „scheme”, „smoothability”, „Hilbert scheme” and is able to show some meaningful examples; 2. is able to formulate theorem of Hartshorne on connectedness of Hilbert scheme, and explain issues on irreducibility of that scheme; 3. Knows how to calculate tangent space to Hilbert scheme, and perform the calculation on examples, as well as interpret the result; 4. masters techniques to learn advanced mathematical material from books and scientific articles, using references, compromising between deep understanding of the problem and accepting for granted some complicated and advanced results.

Assessment methods and criteria	Lists of exercises and exam
Remarks	