# Rafal Urbaniak □□

Research Scientist	. Basis	Research	Institute.	New	York.	USA
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Areas of specialization

causal Bayesian reasoning, probabilistic programming, explainable AI, legal probabilism

Education

2013 Habilitation in Philosophy, University of Warsaw, Poland

2008 Ph.D. in Logic and Philosophy of Mathematics, University of Calgary, Canada

Research projects & stays

2021- Probability on Trial, OPUS grant of the National Science Centre, Poland

2022 Explicating normic support

Bednarowski Trust Fellow, host: Martin Smith, University of Edinburgh, Scotland

2022 Epistemological challenges to imprecise probabilism

The Kosciuszko Foundation Fellowship, host: Branden Fitelson, Northeastern Unversity, USA

2017- Conceptual, formal and practical aspects of forensic and judicial applications of probabilistic tools

Supervision of one post-doctoral and two pre-doctoral researchers

Sonata Bis grant of the Polish National Science Centre, Poland

2015-2019 Forensic and judicial probability vs. probability theory. Formal tools for real-life justifications

Postdoctoral Fellowship of the Research Foundation Flanders, Belgium

2012 Mathematical existence, abstraction principles and real number theory

Trinity College Long Room Hub Visiting Fellow, Trinity College Dublin, Ireland

2012-2015 Mathematical theories with parsimonious ontologies: their strengths and limitations

Postdoctoral Fellowship of the Research Foundation Flanders, Belgium

2011-2012 Knowability paradox and Nyaya logic

Visiting Fellow, Benares Hindu University, Varanasi, India

2009 Modal reconstructions of mathematical theories

British Academy Visiting Fellow, Bristol University, United Kingdom

2009 Development of adaptive logics for the study of central topics in contemporary philosophy of science

Postdoctoral Researcher, Centre for Logic and Philosophy of Science, Ghent University, Belgium

2008 Contextual and formal-logical approach to scientific problem solving processes

Postdoctoral Researcher, Centre for Logic and Philosophy of Science, Ghent University, Belgium

2005-2006 The History of Logical Metatheory

Research Assistant to Prof. Richard Zach, University of Calgary, Canada

Appointments

2023- Research Scientist, Basis Research Institute, New York, USA

2014- Associate Professor, Department of Philosophy, Sociology and Journalism, University of Gdańsk, Poland

2012-2019 Postdoctoral Fellow of the Research Foundation Flanders, Centre for Logic and Philosophy of Science,

Ghent University, Belgium

2008-2014 Assistant Professor, Department of Philosophy, Sociology and Journalism, University of Gdańsk, Poland

2008-2012 Postdoctoral Researcher, Centre for Logic and Philosophy of Science, Ghent University, Belgium

2007 Instructor of Record, Department of Philosophy, University of Calgary, Canada 2005-2008 Teaching Assistant, Department of Philosophy, University of Calgary, Canada

Other selected honors and awards

2014 "Start" scholarship of the Foundation for Polish Science

Selected in Ghent auditions for presentation in TEDx Ghent

2012 Selected for the Academy of Young Scientists of the Polish Academy of Science

2011 The Polish Minister of Science award for young researchers

2006-7 Izaak Walton Killam Memorial Scholarship, University of Calgary

2005 Dean's Entrance Scholarship, University of Calgary

2005 Best M.Sc. thesis in logic, Polish Association for Logic and Philosophy of Science

Leadership

2020-2022 PhD, Michał Tomasz Godziszewski, University of Warsaw, Poland

Formal Theories of Truth and Nonstandard Models of Arithmetic.

Committee: Kentaro Fujimoto, Roman Kossak

2014-2018 PhD, Pawel Pawlowski, Ghent University, Belgium

Informally provable, refutable or neither. A non-deterministic approach to informal provability.

Committee: Leon Horsten, Hannes Leitgeb, Stewart Shapiro, Frederik Van De Putte, Peter Verdée

2020-2021 Assistant Professor at the Chair, dr. Pavel Janda (cooperation)

2019-2020 Postdoctoral fellow, Formal Epistemology with Bounded Rationality and Law, dr. Pavel Janda, Univer-

sity of Gdańsk, Poland

 $2018-2020 \qquad \hbox{Tutoree accepted for a PhD program in Philosophy at Carnegie Mellon University, Alicja Kowalewska,}$ 

Gdańsk University of Technology, Poland (ongoing cooperation)

## Selected courses taught

Statistical methods in criminology with implementation in R; Uncertainty: math, philosophy and R programming; Interpretations of Probability; Probability & philosophy of juridical evidence evaluation; Probability & philosophy; Decisions, games, and social choice theory; Cognitive failures (for journalism students); Meta-arithmetic; Formal theories of truth; Ontology of mathematics; Philosophy of truth; Non-classical logics II; Introduction to Philosophy (for sociology students); Logic II; Logic I

## Programming skills

- Python with focus on causal and dynamical systems probabilistic programming with ChiRho and Pyro.
- R with focus on Bayesian reasoning and Bayesian networks with bnlearn, rethinking, gRain, BESTmcmc, rjags, runjags
- Datacamp status as of Feb 01, 2024: Total 187433 xp earned, 37 courses completed.

#### Books

2021

2024 Urbaniak Rafal, Di Bello, Marcello, Probability on trial, book under contract with Oxford University Press (work in progress)

2017 Rafal Urbaniak and Gillman Payette, editors. Applications of Formal Philosophy. The Road Less Travelled. Springer, 2017

2016 Rafal Urbaniak. Slightly irresponsible and biased introduction to analytic philosophy [in Polish].

Academicon, 2016

2013 Rafal Urbaniak. Leśniewski's systems of logic and foundations of mathematics. Springer, 2013

#### Selected journal papers

Alicja Dobrzeniecka and Rafal Urbaniak. A Bayesian approach to uncertainty in word embedding bias estimation. Computational Linguistics, pages 1-56,  $01\ 2024$ 

2023 Pawel Pawlowski and Rafal Urbaniak. Informal provability and dialetheism. Theoria, 89(2):204–215, 2023

Alicja Kowalewska and Rafal Urbaniak. Measuring coherence with bayesian networks. Artificial Intelligence and Law, 06 2022

Pawel Pawlowski and Rafal Urbaniak. Logic of informal provability with truth values. Logic Journal of the IGPL, 31(1):172–193, 02 2022

Rafal Urbaniak, Michał Ptaszyński, Patrycja Tempska, Gniewosz Leliwa, Maciej Brochocki, and Michał Wroczyński. Personal attacks decrease user activity in social networking platforms. Computers in Human Behavior, 126, January 2022. [DOI: 10.1016/j.chb.2021.106972]

Pawel Pawlowski and Rafal Urbaniak. Informal provability, first-order BAT logic and first steps towards a formal theory of informal provability. Logic and Logical Philosophy, pages 1–27, November 2021

Michał Bilewicz, Patrycja Tempska, Gniewosz Leliwa, Maria Dowgiałło, Michalina Tańska, Rafał Urbaniak, and Michał Wroczyński. Artificial intelligence against hate: Intervention reducing verbal aggression in the social network environment. Aggressive Behavior, January 2021. [DOI: 10.1002/ab.21948]

Rafal Urbaniak and Marcello Di Bello. Legal Probabilism. In Edward N. Zalta, editor, The Stanford Encyclopedia of Philosophy. Metaphysics Research Lab, Stanford University, Fall 2021 edition, 2021

	Rafal Urbaniak and Michał Tomasz Godziszewski. Modal quantifiers, potential infinity, and Yablo sequences. Review of Symbolic Logic, 2021
2020	Rafal Urbaniak, Alicja Kowalewska, Pavel Janda, and Patryk Dziurosz-Serafinowicz. Decision-theoretic
	and risk-based approaches to naked statistical evidence: some consequences and challenges. Law, Probability and Risk, $02\ 2020$
2019	Rafal Urbaniak and Pavel Janda. Probabilistic models of legal corroboration. The International Journal of Evidence & Proof, pages 1–23, 2019. [DOI 10.1177/1365712719864608]
	Rafal Urbaniak. Probabilistic legal decision standards still fail. Journal of Applied Logics, $6(5)$ , August 2019
2018	Rafal Urbaniak. Narration in judiciary fact-finding: a probabilistic explication. Artificial Intelligence and Law, pages $1-32$ , 2018. [DOI: $10.1007/s10506-018-9219-z$ ]
	Małgorzata Stefaniak and Rafal Urbaniak. Varieties of legal probabilism: a survey. Decyzje, 30:33–52, 2018
	Rafal Urbaniak and Pawel Pawlowski. Many-valued logic of informal provability: a non-deterministic strategy. Review of Symbolic Logic, 2018. [DOI:10.1017/S1755020317000363]
2017	R. Urbaniak. Different arguments, same problems. Modal ambiguity and tricky substitutions. European Journal of Analytic Philosophy, 13(2):5–22, 2017
2016	Rafal Urbaniak and Bert Leuridan. Challenging Lewis's challenge to the best system account of lawhood. Synthese, pages $1-18$ , 2016. [DOI:10.1007/s11229-016-1287-6]
	Rafal Urbaniak. Potential infinity, abstraction principles and arithmetic (Leśniewski style). Axioms, $5(2):18,2016$
2015	Rafal Urbaniak. Stanisław Leśniewski: Re-thinking the philosophy of mathematics. European Review, 23:125–138, 2015
2014	Rafal Urbaniak and Paweł Siniło. The inapplicability of (selected) paraconsistent logics. Journal of Applied Non-Classical Logics, 24(4):368–383, 2014
	Rafal Urbaniak. Słupecki's generalized mereology and its flaws. History and Philosophy of Logic, pages $1-12$ , $2014$ . [DOI: $10.1080/01445340.2014.917837$ ]
2013	Cezary Cieśliński and Rafal Urbaniak. Gödelizing the Yablo sequence. Journal of Philosophical Logic, $42(5):679-695$ , 2013. [DOI:10.1007/s10992-012-9244-4]
2012	Rafal Urbaniak. Numbers and propositions versus nominalists: yellow cards for Salmon & Soames. Erkenntnis, 77(3):381–397, 2012
	Rafal Urbaniak. "Platonic" thought experiments: how on earth? Synthese, 187(2):731–752, 2012
	Rafal Urbaniak and K. Severi Hämäri. Busting a myth about Leśniewski and definitions. History and Philosophy of Logic, 33(2):159–189, 2012
2011	Rafal Urbaniak. How not to use the Church-Turing thesis against platonism. Philosophia Mathematica, (III)19:74–89, 2011. [DOI:10.1093/philmat/nkr001]
2010	Rafal Urbaniak. Neologicist nominalism. Studia Logica, 96:151–175, 2010
	Rafal Urbaniak and Agnieszka Rostalska. Swinburne's modal argument for the existence of the soul. Philo, 12:73–98, 2010
	Rafal Urbaniak. Capturing dynamic conceptual frames. Logic Journal of IGPL, 18(3):430–455, 2010
2009	Rafal Urbaniak. Leitgeb, "about", Yablo. Logique & Analyse, 207:239–254, 2009
	Rafał Urbaniak. A note on identity and higher-order quantification. The Australasian Journal of Logic, 7:48–55, 2009
2008	Rafal Urbaniak. Leśniewski and Russell's paradox: some problems. History and Philosophy of Logic, $29(2)$ :115–146, $2008$
	Rafal Urbaniak. Reducing sets to modalities. In Reduction and Elimination. Proceedings of the 31st

Rafal Urbaniak. Time travel and conditional logics. In Michal Peliš, editor, Logica 2007 Yearbook, pages

Wittgenstein Symposium, pages 359–361, 2008

 $247 – 255, \ 2007$ 

2007

2006

Rafał Urbaniak. On representing sentential connectives of Leśniewski's Elementary Protothetic. Journal of Logic and Computation, 16(4):451-460, 2006

Rafał Urbaniak. Some non-standard interpretations of the axiomatic basis of Lesniewski's Ontology. The Australasian Journal of Logic, 4:13–46, 2006

Rafał Urbaniak. On Ontological functors of Leśniewski's elementary Ontology. Reports on Mathematical Logic, 40:15–43, 2006

Other selected publications

2019

Rafal Urbaniak. Neologicism for real(s) - are we there yet? In Mirosław Szatkowski and Bartłomiej Skowron, editors, Contemporary Polish Ontology. De Gruyter, 2019

Michał Tomasz Godziszewski and Rafal Urbaniak. Infinite liar in a (modal) finitistic setting. In Logic and Its Applications, pages 18–29. Springer Berlin Heidelberg, 2019

2018

Rafal Urbaniak and Diderik Batens. Induction. In Sven Ove Hansson, Vincent F. Hendrick, and Kjeldahl Esther Michelsen, editors, Introduction to Formal Philosophy, pages 105–130. Springer, 2018

Rafal Urbaniak and Pawel Pawlowski. Logics of (formal and informal) provability. In Sven Ove Hansson, Vincent F. Hendrick, and Kjeldahl Esther Michelsen, editors, Introduction to Formal Philosophy, pages 191–240. Springer, 2018

Rafal Urbaniak and Michał Tomasz Godziszewski. Material implication and conversational implicature in Lvov-Warsaw School. In Ángel Garrido and Urszula Wybraniec-Skardowska, editors, The Lvov-Warsaw School. Past and Present, pages 117–132. Springer International Publishing, 2018

2017

Rafal Urbaniak. Reconciling Bayesian epistemology and narration-based approaches to judiciary fact-finding. In Jérôme Lang, editor, Proceedings Sixteenth Conference on Theoretical Aspects of Rationality and Knowledge, Liverpool, UK, 24-26 July 2017, volume 251 of Electronic Proceedings in Theoretical Computer Science, pages 504–514. Open Publishing Association, 2017

Rafal Urbaniak. Beating the gatecrasher paradox with judiciary narratives. In Alexandru Baltag, Jeremy Seligman, and Tomoyuki Yamada, editors, Logic, Rationality, and Interaction: 6th International Workshop, LORI 2017, Sapporo, Japan, September 11-14, 2017, Proceedings, pages 637–642. Springer, 2017

2011

Rafal Urbaniak and Agnieszka Rostalska. A modern modal argument for the soul. In Michael Bruce and Steven Barbone, editors, Just the arguments, pages 93–99. Wiley-Blackwell, 2011

Selected talks

Invited and departmental talks

2021

Story coherence with Bayesian Networks with Alicja Kowalewska, invited webinar at Center for Logic, Language, and Cognition University of Turin, Italy

Story coherence with Bayesian Networks, invited graduate class taught with Alicja Kowalewska at Arizona State University, USA

2018

Potential Infinity, Leśniewskian Definitions, Arithmetic & Yablo sequences, Logic, Language, and Ontology – WaragaiFest 2018, Tokyo, Japan

Modal Quantifiers, Potential Infinity, and Yablo sequences, Proof Society Summer School 2018, Ghent University, Belgium

2017

Narrations in judiciary fact-finding and the difficulty about conjunction, Faculty of Philosophy, University of Groningen, Netherlands

Paradoxes of informal provability and many-valued indeterministic provability logic, Kyoto Philosophical Logic Workshop III, Kyoto University, Japan

Narration in Judiciary Fact-Finding: A Probabilistic Explication, Tokyo Forum for Analytic Philosophy, The University of Tokyo, Japan

2015

Non-deterministic logic(s) of (informal) provability, University of Oxford (United Kingdom), University of Oslo (Norway)

A non-classical logic of informal provability (with Pawel Pawlowski), Munich Center for Mathematical Philosophy, Germany

Non-deterministic logics of provability, ∃ntia et Nomin ∀ 2015, Cracov, Poland

Workshop on probabilistic logic, Metafizz Student Club, Trinity College Dublin, Ireland 2013 Mereology and mathematics. The case of Leśniewski and his continuators, Parts in Logic and Metaphysics, Université de Rennes I, France Stanisław Leśniewski: Re-thinking the philosophy of mathematics, Academia Europaea 25th anniversary congress, Wrocław, Poland 2012 Gödelizing the Yablo sequence, Trinity College Dublin, Ireland Neologicism: for real(s), Numbers and Truth, University of Gothenburg, Sweden Abstraction without abstracta, Polish Philosophical Congress, Wisła, Poland The philosophical usefulness of paradoxes, Banaras Hindu University, Varanasi, India Busting a myth about Leśniewski and definitions, Warsaw University, Poland 2010 Frames, similarity, many-valuedness, Workshop on Types and Frames, Heinrich-Heine Universität, Düsseldorf, Germany Yellow Card for Salmon, Oxford University, United Kingdom Swinburne's modal argument for the existence of the soul (with Agnieszka Rostalska), Canterbury University, Christchurch, New Zealand 2009 Modalities+Identities-Entities, Structure and Identity and Abstraction Workshop, Bristol University, United Kingdom Galileo on falling bodies, Platonism, Dynamic Reasoning, Université Paris I Panthéon-Sorbonne, France Nominalist Neologicism, University of St. Andrews, Scotland Abstraction without Abstracta, Trinity College Dublin, Ireland Modality and Existence, keynote address, Polish Society for Logic and Philosophy of Science annual meeting, Warsaw University, Poland Logic and Religion: a case study, Bristol University, United Kingdom Nameability and Mathematical Existence, Logic & Language Seminar, University of Edinburgh, Scotland 2008 (1) What sentences refer to and (2) Quantified propositional modal logic and philosophy (with Agnieszka Rostalska), University of Edinburgh, Scotland 2006 Demonstratives in Logica Magna, Workshop on Medieval Nominalism, University of Quebec, Montreal, Canada 2005 On ontological functors of Leśniewski's Ontology, Polish Association for Logic and Philosophy of Science (award reception), Warsaw University, Poland Conference & workshop presentations 2020 (1) Story coherence with Bayesian Networks with Alicja Kowalewska, and (2) Imprecise Credences Can Increase Accuracy wrt. Claims about Expected Frequencies, Bayesian Epistemology: Perspectives and Challenges, LMU, Munich, Germany 2019 (1) Modal Quantifiers, Potential Infinity, and Yablo sequences with Michał Tomasz Godziszewski, and (2) Combining truth values with provability values: a non-deterministic logic of informal provability with Paweł Pawlowski, International Congress of Logic, Methodology and Philosophy of Science and Technology, Prague, Czech Republic 2018 Infinite liar in a (Modal) Finitistic Setting, 8th Indian Conference on Logic and its Applications, ICLA 2019, Delhi, India (1) Abstraction Principles via Leśniewskian definitions. Potential infinity and arithmetic and (2) Narrations in judiciary fact-finding and the difficulty about conjunction, Unilog 2018, Vichy, France 2017 Reconciling Bayesian epistemology and narration-based approaches to judiciary fact-finding, Sixteenth conference on Theoretical Aspects of Rationality and Knowledge 2017, University of Liverpool, United

Beating the Gatecrasher Paradox with Judiciary Narratives, Logic, Rationality, and Interaction 2017:

Probabilistic Explication of the Notion of Narration as Used in Judiciary Contexts, Progic 2017: The 8th

Kingdom

6th International Workshop, Sapporo University, Japan

workshop on Combining Probability and Logic, Munich, Germany

Probabilistic explication of the notion of narration as used in judiciary contexts, ∃ntia et Nomin 2017, Palolem, India Understanding conditionals, Hokudai-Ghent Joint Symposium "Connecting Japan and Belgium", Ghent, Belgium Failxplication of truth (untyped), Language and metalanguage, logic and meta-logic. Revisiting Tarski's hierarchy, Louvain-la-Neuve, Belgium Probabilistic explication of the notion of narration as used in judiciary contexts, Justification of court decisions: law-theoretic and interdisciplinary perspectives, Jablonna, Poland

Not too abstract abstraction principles for real numbers, Polish Ontology Nowadays, Warsaw, Poland 2015 The non-applicability of selected paraconsistent logics, 15th Congress of Logic, Methodology and Philosophy of Science, Helsinki, Finland

First steps towards non-classical logic of informal provability (with Pawel Pawlowski), 15th Congress of Logic, Methodology and Philosophy of Science, Helsinki, Finland

2014 Verbality and Disagreement in the Nyaya-Samkhya debate about causality, Udaharanas, Drstantas and Nyayas in Texts and Contexts, Gujarat University, Ahmendabad, India

Irrational bookies, Third Reasoning Club Conference, University of Kent, United Kingdom

A comparative study of selected filtered paraconsistent logics, 5th World Congress on Paraconsistency, Kolkata, India

2012Gödelizing the Yablo sequence, Trends in Logic XI – Advances in Philosophical Logic, Ruhr-Universität Bochum, Germany

> Haecceitas and possible worlds, Philosophical perspectives on individuals, University of Gdańsk, Poland (1) Busting a myth about Leśniewski and definitions and (2) Platonic thought experiments? How on earth?, 14th Congress of Logic, Methodology and Philosophy of Science, Nancy, France

> (1) Proving unprovability by de-paradoxizing paradoxes and (2) Dynamic modeling of "platonic" thought experiments, ∃ntia et Nomin∀ 2011 Workshop, University of Gdańsk, Poland

> A semantical approach to Yablo sentences, Seventh Barcelona Workshop on Issues in the Theory of Reference, University of Barcelona, Spain

> How not to use the Church-Turing thesis against platonism, Trends in Logic IX – Studia Logica International Conference, Church's Thesis: Logic, Mind and Nature, Jagiellonian University, Cracow, Poland Nominalistic Neologicism, XX SIUCC SEFA (Sociedad Española de Filosofia Analitica) Workshop with Crispin Wright, University of Barcelona, Spain

> Platonism, Dynamic Reasoning, and Galileo on Falling Bodies, Logic, Reasoning, Rationality, Ghent University, Belgium

> Nominalism and the modal unstability of Barcan and Reversed Barcan formulas across orders, CeLL Workshop on Second-Order Modal Logic, School of Advanced Study, University of London, United King-

> Anti-Fregean neologicism, Trends in the Philosophy of Mathematics (Trends in Logic VII), Goethe University, Frankfurt, Germany

- (1) Abstraction Principles, a modal interpretation and (2) Platonic thought experiments? Mundane but adaptive, Société de Philosophie Analytique congress, Geneva, Switzerland
- (1) Induction from a single instance: incomplete frames (with Frederik Van De Putte) and (2) Adaptive reasoning with dynamic conceptual frames, Concept Types and Frames in Language, Cognition, and Science, Heinrich-Heine-Universität, Düsseldorf, Germany

Plurals and the cumulative set hierarchy, Non-Classical Mathematics 2009, Hejnice, Czech Republic Swinburne's modal argument for the existence of souls; Formal aspects (with Agnieszka Rostalska), Formal Methods in the Epistemology of Religion, Katholieke Universiteit Leuven, Belgium

Paradox & Reference, PhDs in Logic workshop, Ghent University, Belgium

(1) Logic and Philosophy: a case study: a modal argument for the existence of souls (with Agnieszka Rostalska) and (2) Capturing dynamic conceptual frames, Workshop & Young Researcherís Days in Logic,

6

2016

2011

2010

2009

Philosophy and History of Science, Palais des Académies, Brussels, Belgium

Reducing sets to modalities, 31st International Wittgenstein Symposium of the Austrian Ludwig Wittgenstein Society, Kirchberg, Austria

Time Travel and Conditionals, Logica 2007, Hejnice, Czech Republic

Tooley's Example and Conditional Logics, the annual meeting of the Society for Exact Philosophy, UBC, Vancouver, Canada

Some Problems with Leśniewski's Foundations of Mathematics, Mathematical Methods in Philosophy, Banff International Research Station for Mathematical Innovation and Discovery, Canada

The (in)significance of Tooley's example, a commentary at the Western Canadian Philosophical Association Conference, University of British Columbia, Vancouver, Canada

Editorial & organizational work

Associate Editor: Studia Logica

2006

Referee: Bulletin of Symbolic Logic, Erkenntnis, Synthese, Council for the Humanities of the Netherlands Organization for Scientific Research, Review of Symbolic Logic, Studia Logica, Journal of Philosophical Logic, Journal of Applied Non-Classical Logic, Logique & Analyse, Journal of Philosophical Research, Foundations of Science, History and Philosophy of Logic, Theoria, Logic and Logical Philosophy, Polish Journal of Philosophy

Main Organizer: International Conference for Philosophy of Science and Formal Methods in Philosophy (CoPS-FaM-19) of the Polish Association for Logic and Philosophy of Science, Gdansk, Poland, Entia et Nomina 2018, Gdansk, Poland, Entia et Nomina 2017, Palolem, India, Swamplandia - Meta-arithmetical results and their philosophical meaning, Ghent University, 2016, Academic Caffee of the Polish Academy of Science, University of Gdańsk, Poland, 2016, Trends in Logic XIV, 2014, Ghent University, Belgium, Philosophers' Rally, 2012, University of Gdańsk, Poland, Entia et Nomina 2013, Entia et Nomina 2011, Entia et Nomina 2010, University of Gdańsk, Poland, Graduate Colloquia Series, University of Calgary, 2007-2008