

# Dr Emilie Dufresne

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**Citizenship:** Canadian

**Languages:** French (native), English (to native standard), German ( $\geq$ B2)

**Research Interests:** Commutative algebra and its interactions with algebraic geometry; invariant theory; separating invariants; applications of invariant theory and commutative algebra; structural identifiability and reparametrization of ODE models with time-series or steady-state data.

## EDUCATION

- 2004-2008: Ph. D. in Mathematics, Queen's University, Kingston, ON, Canada  
Separating Invariants. *Ph. D. thesis, Queen's University, Kingston, ON, Canada, 2008.*  
Supervisor: David Wehlau
- 2003-2004: M. Sc. in Mathematics, Queen's University, Kingston, ON, Canada  
Supervisor: David Wehlau
- 2000-2003: B. Sc. in Mathematics, Université Laval, Québec, QC, Canada

## ACADEMIC APPOINTMENTS

- Sept. 2018 - present: Lecturer in Algebra, University of York, UK
- Jan. 2017 - Aug. 2018: (100%) Anne McLaren Fellow and proleptic Assistant Professor, School of Mathematical Sciences, University of Nottingham, UK
- Dec. 2015 - Nov. 2016: (100%) Postdoctoral Research Assistant in the group Algebraic Systems Biology, University of Oxford, UK
- Oct.- Nov. 2015: (100%) LMS Grace Chisholm Young Fellow, Department of Mathematical Sciences, Durham University, UK
- Feb.-Sep. 2015: (75%) LMS Grace Chisholm Young Fellow and teaching staff, Department of Mathematical Sciences, Durham University, UK
- Jan. 2015 (75%) Teaching Staff and research visitor, Department of Mathematical Sciences, Durham University, UK
- Oct.-Dec. 2014: (50%) Teaching Staff and research visitor, Department of Mathematical Sciences, Durham University, UK
- Mar. - Oct. 2014 : (0%) Maternity leave
- Oct. 2013- Mar. 2014 : (100%) Teaching Staff and research visitor, Department of Mathematical Sciences, Durham University, UK
- June-Sept. 2013: (100%) Research visitor, Mathematic Center Heidelberg (MATCH), Mathematisches Institut, Ruprecht-Karls-Universität Heidelberg, Germany
- Jan.-May 2013: (100%) Postdoctoral Fellow in the research program "Commutative Algebra", Mathematical Sciences Research Institute (MSRI), Berkeley, USA
- Sept. 2010- Dec. 2012: (100%) Postdoctoral Assistant, Mathematisches Institut, Universität Basel, Switzerland
- Sept. 2008- Aug. 2010 : (100%) Postdoctoral Fellow, Mathematic Center Heidelberg (MATCH), Mathematisches Institut, Ruprecht-Karls-Universität Heidelberg, Germany

## PUBLICATIONS

13. Sampling real algebraic varieties for topological data analysis (with Parker B. Edwards, Heather A. Harrington and Jonathan D. Hauenstein), *accepted as a short paper in the 2019 IEEE ICMLA TDA in ML Special Session*, extended version posted at on the arXiv: 1802.07716.
12. The Geometry of Sloppiness (with Heather A. Harrington and Dhruva V. Raman), *Journal of Algebraic Statistics* 9 (1) 2018
11. Determinantal Generalizations of Instrumental Variables, (authors: Luca Weihs, Bill Robinson, ED, Jennifer Kenkel, Kaie Kubjas, Reginald L. McGee II, Nhan Nguyen, Elina Robeva, Mathias Drton) *Journal of Causal Inference* 6 (1) (2017)
10. Mapping toric varieties into low dimensional spaces (with Jack Jeffries), *accepted for publication in Trans. Amer. Math. Soc.* 2016
9. Invariants and Separating Morphisms for Algebraic Group Actions (with Hanspeter Kraft), *Mathematische Zeitschrift.* 2015 Jun;280(1-2):231–255.
8. Separating invariants and local cohomology. (with Jack Jeffries) *Adv. Math.* 270 (2015) 565-581
7. Separating invariants for arbitrary linear actions of the additive group. (with Jonathan Elmer and Müfit Sezer) *Manuscripta Math.* 143 (1-2) (2014) 207-219
6. The separating variety for the basic representations of the additive group. (with Martin Kohls) *J. Algebra* 377 (1) (2013) 269-280
5. Finite separating sets and quasi-affine quotients, *J. Pure Appl. Algebra* 217 (2) (2013) 247-253
4. A finite separating set for Daigle and Freudenburg's counterexample to Hilbert's fourteenth problem. (with Martin Kohls) *Comm. Algebra.* 38(11) (2010) 3987-3992
3. On the finite generation of additive group invariants in positive characteristic. (with Andreas Maurischat) *J. Algebra* 324 (8) (2010) 1952-1963
2. The Cohen-Macaulay property of separating invariants of finite groups. (with Jonathan Elmer and Martin Kohls) *Transform. Groups.* 14 (4) (2009) 771-785
1. Separating invariants and finite reflection groups . *Adv. Math.* 221 (6) (2009) 1979-1989

## Preprints.

2. Inference of Multisite Phosphorylation Rate Constants and their Modulation via Pathogenic Mutations (authors list: Eyan Yeung, Sarah McFann, Lewis Marsh, Emilie Dufresne, Sarah Filippi, Heather A. Harrington, Martin Wühr, Stanislav Y. Shvartsman), *submitted* 2019
1. On Some Configurations of Oppositely Charged Trapped Vortices in the Plane (with Heather A. Harrington, Panayotis G. Kevrekidis and Paolo Tripoli), *submitted* 2018

## AWARDS, FELLOWSHIPS AND GRANTS

- 2016- present: LMS Scheme 3 grant for Applied Algebra and Geometry: <https://sites.google.com/view/appliedalgebraandgeometry>
- Jan. 2017-Aug. 2018: Anne McLaren Fellowship from the University of Nottingham, to work within the School of Mathematical Sciences for three years, came with generous research funds.
- Feb. 2015-Jan. 2016: LMS Grace Chisholm Young Fellowship in the Department of Mathematical Sciences at Durham University
- Mathematical Sciences Research Institute (MSRI) PostDoctoral Fellowship for the Winter 2013 Semester of the research program "Commutative Algebra"
- 2010-2012: Bourse de recherche postdoctorale (B3), Fonds québécois de recherche sur la nature et les technologies (FQRNT) to work with Hanspeter Kraft in Basel
- Sept. 4, 2009: Award for best contribution (talk), "Algebraic Groups and Invariant Theory" conference at Centro Stefano Franscini, Ascona, Switzerland
- 2007: Robert Charles Wallace Graduate Award, Queen's University
- 2005-2008: Alexander Graham Bell Canada Graduate Scholarship from the Natural Sciences and Engineering Research Council of Canada (NSERC), Ph.D. level
- 2004-2005: Alexander Graham Bell Canada Graduate Scholarship from NSERC, master's level
- Summer 2004: Bourse de maîtrise en recherche (B1), from FQRNT

- 2003-2004: Senator Frank Carrel Scholarship, Queen's University
- Summer 2003: Undergraduate Student Research Awards from NSERC, held at Université du Québec à Montréal (UQÀM), supervisor: Olivier Collin
- May 2003: Prix de la Caisse Populaire Desjardins de l'Université Laval (for my written end of study project and oral presentation)
- Summer 2002: Undergraduate Student Research Awards from NSERC, held at Université Laval, supervisor: Claude Levesque
- Summer 2001: Undergraduate Student Research Awards from NSERC, held at Université Laval, supervisor: Charles Cassidy

## SCIENTIFIC ACTIVITIES

### Invited talks: conferences and workshops.

#### 2018

- Sept.: 54th Algebra and Representation Theory in the North (ARTIN 54), Department of Mathematics, University of York, UK
- June: Eightieth BLOC meeting, City University of London, UK
- April: Workshop on Symmetry & Computation, CIRM, Marseille, France
- March: Applied Algebra and Combinatorics, Department of Mathematics, Swansea University, UK
- Jan.: Applied Algebra and Geometry, fourth meeting, University of Nottingham, UK

#### 2017

- Oct.: East Midlands Seminars in Geometry, Loughborough University, UK
- Aug.: A Focused Research Workshop on Toric Degenerations, University of Bristol, UK
- June: Invariant Theory: New progress and Applications, LMS celebrating new appointments workshop for Jon Elmer, Middlesex University, London, UK
- June: Algebraic Topology and Representation Theory (ATRT), Université de Lille, France
- April: Computational Algebra Workshop, King's College, University of Cambridge, UK

#### 2015

- Dec.: Meeting on Algebra and Geometry, Barcelona, Spain
- Sep.: Workshop on new techniques in geometric invariant theory, Berlin, Germany

#### 2014

- Sep.: Meeting On Combinatorial Commutative Algebra (MOCCA 2014), Levico Terme, Italy

#### 2013

- Nov.: Leeds York Lie Theory meeting (LYLT), University of York, UK

#### 2012

- Nov.: Conference in Algebraic Geometry "BirPol 3", Universität Basel, Switzerland
- May: Meeting on "Modular Algebras - representations, invariants and Lie theory", Friedrich-Schiller-Universität Jena, Germany

#### 2011

- Oct: Workshop: Affine Algebraic Geometry, Institut de Mathématiques de Bourgogne, Dijon, France
- March: Real and complex affine algebraic geometry, Angers, France

#### 2007

- Sept.: Route 81 Conference; Cornell University, Ithaca, NY, USA

### Invited talks: departmental seminars.

#### 2018

- Jan.: Algebra Seminar, Department of Mathematics, University of York, UK
- Jan.: Algebra Seminar, School of Mathematics and Statistics, University of Glasgow, UK

#### 2017

- Nov.: Algebra/ Algebraic Geometry Seminar, School of Mathematics and Statistics, University of Sheffield, UK
- Nov.: Algebra, Geometry and Topology Seminar, School of Mathematics, Statistics and Actuarial Sciences, University of Kent, Canterbury, UK
- Oct.: Leeds Algebra Seminar, School of Mathematics, University of Leeds, UK
- Oct.: Statistics Seminar, Department of Mathematical Sciences, Durham University, UK
- Oct.: Statistics Seminar, School of Mathematics and Statistics, University of Glasgow, UK
- Feb.: Mathematics Research Seminar, University of Middlesex, London, UK

**2016**

- Nov.: Oberseminar Algebra und Geometrie, Ovgu Magdeburg, Germany
- Oct.: Algebraic and Symplectic Geometry Seminar, Mathematical Institute, University of Oxford, UK
- April: (Colloquium talk), Colloque du mardi, Institut de Mathématiques, Université de Neuchâtel, Switzerland

**2015**

- Nov.: Seminar Algebra and Geometry, Mathematisches Institut, universität Basel, Switzerland
- Nov.: Algebra Seminar, Department of Mathematics, University of York, UK
- Apr.: Pure Mathematics Seminar, Department of Mathematics and Statistics, Lancaster University, Lancaster UK
- Mar.: Algebra Seminar, School of Mathematics, University of Kent, Canterbury, UK
- Mar.: Warwick Algebraic Geometry Seminar, Warwick Mathematics Institute, University of Warwick, Coventry, UK
- Feb: Algebra-Geometry Seminar, School of Mathematics and Statistics, Newcastle University, Newcastle, UK

**2013**

- Dec.: Séminaire CCCP- Théorie des Représentations, Sophie Germain (Univ. Paris-Diderot), Paris, France
- Nov.: Algebra Seminar, Mathematics department, University of Aberdeen, UK
- Nov.: MAXIMALS algebra seminar, School of Mathematics, University of Edinburgh, UK
- Nov.: Algebra Seminar, School of Mathematics, University of Manchester, UK
- Oct.: Pure Maths Colloquium, Department of Mathematical Sciences, Durham University, UK
- July: Oberseminar komplexe Geometrie, Ruhr-Universität Bochum, Germany
- July: Arbeitsgemeinschaft Algebra, TU München, Garching, Germany
- March: Representation Theory, Geometry, and Combinatorics Seminar, University of California, Berkeley, USA

**2012**

- Jan.: Séminaire Algèbre et Géométries, Institut Fourier, Grenoble, France

**2011**

- June: Mathematisches Institut, Universität Tübingen, Germany
- June: Hauptseminar Algebra und Zahlentheorie, Mathematisches Institut, Universität Heidelberg, Germany
- June: General Seminar, Department of Mathematics, Bilkent University, Ankara, Turkey
- May: Oberseminar: Algebraische Geometrie, Institut für Mathematik, Universität Zürich, Switzerland
- March: EPFL Group Theory Seminar, École polytechnique fédérale de Lausanne, Switzerland

**2010**

- Dec.: Séminaire Géométrie et Systèmes dynamiques, Institut de Mathématiques de Bourgogne, Dijon, France
- April: Oberseminar Algebra, Lehrstuhl A für Mathematik, RWTH Aachen, Germany
- April: Special session on invariant theory, School of Mathematical Sciences, Queen Mary University of London, UK
- April: Department of Mathematics and Statistics, University of Canterbury, UK
- April: School of Mathematics, University of Birmingham, UK

**2009**

- Dec.: M11, TU München, Garching, Germany

- Aug.: M11, TU München, Garching, Germany
- May: Algebra Seminar, Bilkent University, Ankara, Turkey

**2008**

- Nov.: M11, TU München, Garching, Germany
- Feb.: Commutative Algebra Seminar, University of Nebraska-Lincoln, NE, USA

**Research visits.****2016**

- Jan. 12-18: host Bernd Sturmfels, Department of Mathematics, University of California, Berkeley, USA

**2013**

- Aug. 18-23: host: Hanspeter Kraft, Mathematisches Institut, universität Basel, Switzerland
- July 1-5: host: Martin Kohls, M11, TU-München, Garching, Germany

**2012**

- Sep. 9-14: host: Martin Kohls, M11, TU-München, Garching, Germany

**2011**

- June 5-12: host: Müfit Sezer, Bilkent University, Ankara, Turkey
- Feb. 14-26: host: Martin Kohls, M11, TU-München, Garching, Germany

**2010**

- Aug. 16-20: host: Martin Kohls, M11, TU-München, Garching, Germany
- April 12-16: host: Jonathan Elmer, other guest: Martin Kohls, Queen Mary University of London, UK

**2009**

- Dec. 1-4: host: Martin Kohls, M11, TU-München, Garching, Germany
- Aug. 2-15: host: Martin Kohls, M11, TU-München, Garching, Germany
- May 11-19: host: Müfit Sezer, Bilkent University, Ankara, Turkey
- March 29 - Apr. 3: host: Martin Kohls, other guest: Jonathan Elmer, M11, TU-München, Garching, Germany

**2008**

- Nov. 25 - Dec. 5: host: Gregor Kemper, M11, TU-München, Garching, Germany

**Other talks at workshops and conferences.****2018**

- June: special session on "Algebraic Groups and related topics" of the Summer Meeting of the Canadian Mathematical Society, Fredericton, NB, Canada

**2017**

- July: Minisymposium on Symmetries in Algebraic Computations, 2017 SIAM Applied Algebraic Geometry Conference, Atlanta, Georgia, USA
- July: Minisymposium on Discrete Mathematical Biology, 2017 SIAM Annual Meeting, Pittsburgh, Pennsylvania, USA

**2016**

- July: Minisymposium in Algebraic Statistics, 2016 SIAM annual meeting, The Westin Boston Waterfront, Boston, Massachusetts, USA

**2012**

- April: Workshop on Algebraic Transformation Groups, British Mathematical Colloquium, University of Kent, Canterbury, UK

**2011**

- April: Tagung deutschsprachiger Mathematikerinnen, RWTH Aachen, Germany

**2010**

- Nov.: Special Session on Algebraic Group Actions on Affine Varieties, 2010 Fall Central Section Meeting of the AMS, Notre Dame, IN, USA
- June: Scientific session on Group Actions and their Invariants, Summer meeting of the Canadian Mathematical Society (CMS), Fredericton, NB, Canada

**2009**

- "Algebraic Groups and Invariant Theory" conference at Centro Stefano Franscini, Ascona, Switzerland

- June: Scientific session on Algebraic Group Actions and Invariant Theory, Summer meeting of the Canadian Mathematical Society (CMS); St-John's, NFL, Canada
- May: Antalya Algebra Days XI; Antalya, Turkey

**2008**

- Sept.: Workshop on interactions between representation theory and commutative algebra; Institute de Matematica, Universitat de Barcelona, Spain
- May: Canada Young Researchers Conference; University of Alberta, Edmonton, AB, Canada
- May: Ottawa Mathematics Conference; University of Ottawa, ON, Canada
- Jan.: Special session on Structure, Geometry, and Symbolic Computation of Algebraic Groups and Symmetric Spaces, AMS-MAA Joint meeting; San Diego, CA, USA

**2007**

- Oct.: Pure Math Graduate Student Conference 2007; Simon Fraser University, Burnaby, BC, Canada
- May: Colloque pan-québécois des étudiants de l'ISM; Concordia University, Montréal, QC, Canada

**2006**

- May: Colloque pan-québécois des étudiants de l'ISM; Université Laval, Québec, QC, Canada

**Other participations in conferences and schools.****2017**

- April: British Mathematics Colloquium 2017 (BMC 2017), Durham University, UK
- Jan.: T-time meeting on Toric Methods, School of Mathematics, University of Manchester, UK

**2016**

- June: Mathematical Research Communities (MRC) conference on Algebraic Statistics, Snowbird, Utah, USA
- April: Academic participant, European Study Group with Industry (ESGI116), Durham University, UK
- April: British Applied Mathematics Colloquium 2016 (BAMC 2016), University of Oxford, UK
- Jan.: Algorithmic Challenges in Genomics Boot Camp; Simons Institute, Berkeley, USA

**2015**

- June: Workshop on Minimal free resolutions, Betti numbers, and combinatorics; ICMS, Edinburgh, UK

**2013**

- Oct.: Maxwell Colloquium on Combinatorial Algebraic Geometry; ICMS, Edinburgh, UK
- July: Commutative Algebra and its Interactions with Algebraic Geometry; CIRM. Luminy, France
- June: Effective Methods in Algebraic Geometry (MEGA 2013); Goethe Universität, Frankfurt, Germany
- Feb.: Representation Theory, Homological Algebra, and Free Resolutions Workshop; MSRI, Berkeley, CA, USA
- Jan.: Introductory Workshop: Noncommutative Algebraic Geometry and Representation Theory; MSRI, Berkeley, CA, USA
- Jan.: Connections for Women: Noncommutative Algebraic Geometry and Representation Theory, MSRI, Berkeley, CA, USA

**2012**

- Oct.: Groups of Automorphisms in Birational and Affine Geometry; CIRM, Levico Terme, Italy
- Sept.: School (and Workshop) on Invariant Theory and Projective Geometry; Fondazione Bruno Kessler, Povo (Trento), Italy
- May: Géométrie algébrique affine réelle et complexe, Rencontre ANR BirPol; La Rochelle, France
- Feb.: Swiss-French Workshop on Algebraic Geometry; Enney, Switzerland
- Jan.: Workshop "Géométrie birationnelle et affine", Rencontre ANR BirPol; Toulouse, France

**2011**

- Nov.: Oberwolfach Seminar: Affine Algebraic Geometry and Group Actions; Mathematisches Forschungsinstitut Oberwolfach, Germany
- June: On birational transformations and automorphisms of affine varieties; Mathematisches Institut, Universität Basel, Switzerland

- May: Journées de Géométrie Affine à Grenoble; Institut Fourier, Grenoble, France
  - Jan. : Winter School on Birational Geometry, Les Diablerets, Switzerland
- 2010**
- Nov. : Workshop: Polynomial automorphisms and birational geometry; Institut de Mathématiques de Bourgogne, Dijon, France
  - Oct. : Workshop: Automorphisms of Affine Space; Institut Camille Jordan, Lyon, France
- 2008**
- May: Commutative Algebra: Connections with Algebraic Topology and Representation Theory. A conference on the occasion of Luchezar Avramov's 60th birthday; University of Nebraska, Lincoln, NE, USA
- 2007**
- July: PIMS Algebra Summer School; University of Alberta, Edmonton, AB, Canada
  - May: Program for Women in Mathematics 2007: Algebraic Varieties and Group Actions; Institute for Advanced Studies, Princeton, NJ, USA
- 2006**
- July: Symmetry and Spaces; A Conference on the Occasion of Gerry Schwarz's 60th Birthday; Fields Institute, Toronto, ON, Canada
  - Jan.: AMS-MAA Joint Meeting; San Antonio, TX, USA
- 2005**
- Sept.: Route 81 Conference; Queen's University, Kingston, ON, Canada
- 2004**
- Dec.: Winter meeting of the CMS; Montréal, QC, Canada
  - Nov.: Red Raider Symposium: Perspectives in Invariant Theory; Texas Tech University, Lubbock, TX, USA
  - Jan.: Inverse Systems Meets Combinatorics Conference; Queen's University, Kingston, ON, Canada

#### SERVICE, AND FURTHER ACTIVITIES

##### **Conference, workshop, and seminar organisation.**

- April 2019: Co-chair for the 9th April session of the Nonlinear Algebra Seminar Online (NASO), Max Planck Institute for Mathematics in the Sciences, Leipzig (online).
- Jan. 2019: organiser: Seventh meeting of the Applied Algebra and Geometry research network, University of York, UK
- Oct. 2018-present: organiser, York Algebra Seminar, University of York, UK
- Jan. 2018: organiser, Fourth meeting of the Applied Algebra and Geometry research network, University of Nottingham, UK
- Sept. 2017: Co-organiser, Third meeting of the Applied Algebra and Geometry research network, University of Oxford, UK
- July 2017: Member of organising committee, SIAM Workshop on Parameter Space Dimension Reduction (DR17), Pittsburgh, PA, USA
- April 2017: organiser, Algebra Workshop, British Mathematical Colloquium (BMC 2017), Durham University, UK
- Feb. 2017: organiser, Inaugural meeting of the Applied Algebra and Geometry research network, University of Nottingham, UK
- June 2016: Co-organiser, Applied Algebra mini-workshop, Mathematical Institute, University of Oxford, UK
- Summer semester 2010: Co-organiser (with Andreas Maurischat), Hauptseminar Galoistheorie, theme: Locally nilpotent derivations and Hilbert's fourteenth problem, Universität Heidelberg, Germany
- Feb. 2009: organiser, Mini-Workshop on Invariant Theory; MATCH, Universität Heidelberg, Germany
- 2005-2008: organiser, The Graduate Student Seminar; Department of Mathematics and Statistics, Queen's University, Kingston, ON, Canada

**Committee and panel membership.**

- Oct. 2017: Volunteer and panelist, Careers in academia event for PhD students and postdocs in maths, School of Mathematical Sciences, University of Nottingham, UK
- Nov. 2016: Panelist, Careers in research panel, Jobs for Mathematicians Fair, Mathematical Institute, University of Oxford, UK
- Nov. 2016- present: Member of the Early Career Researcher Committee, Mathematical Institute, University of Oxford, UK
- Jan. 2016- present: Member of the Good Practice Steering Group, Mathematical Institute, University of Oxford, UK
- May 2015: Panelist, panel on the theme: advice on applying for academic positions and funding in general e.g. fellowship funding; PDRA forum meeting, Department of Mathematical Sciences, Durham University, UK.
- 2005-2006: Graduate student representative on the hiring committee; Department of Mathematics and Statistics, Queen's University, Kingston, ON, Canada

**Outreach and scientific community.**

- Jan. 2017-present: Member of the AMS.
- Nov. 2016-present: Member of the LMS.
- Nov. 2016: Talk in the North meet South Colloquium, Mathematical Institute, University of Oxford, UK
- Oct. 2016: Talk for the STEM Society (outreach), Oxford High School, Oxford UK
- Jun. 2016-present: Founding member and organiser, UK-wide LMS funded research Network on Applied Algebra and Geometry
- July 2015 - present: Member of SIAM and SIAM activity group: Algebraic Geometry.
- Referee work: Transformation Groups. Journal of Algebra. Quaterly Journal of Mathematics.



## TEACHING EXPERIENCE

**Student supervision and mentoring of postdoctoral researcher:**

2017-present: University of Nottingham (in English)

- As of September 2017, Paolo Tripoli is working with me as a postdoctoral research assistant.

2016-2017: University of Oxford (in English)

- Summer 2017: With Heather Harrington and Frances Kirwan, I co-supervised a second short project of a student from the Systems Biology DTC, Rohan Arambepola. The project looks at constructing model prediction maps for models given by ODE systems with steady-state data.
- 2016-2017: With Heather Harrington, I co-supervised a student, Richard Tanburn, for a Part C project as part of his MMath degree program. The project looks at Differential Algebra and Applications, with a particular focus on exploiting symmetries to obtain reparametrizations of ODE systems.
- Summer 2016: I co-supervised a student, Parker Edwards, in the Master in Mathematics and the Foundations of Computer Science (MFoCS). The project looked at Sampling points on real algebraic varieties and topological data analysis. Parker Edwards finished with a distinction and was awarded one of two prizes.

2013-2015: Durham University (in English)

- February 2014: Host of Fabian Reimers, Doctoral student of Gregor Kemper at the Technische Universität München.
- 2014-2015: I supervised the end of study projects of 3 bachelor's student. The topic was Invariant Theory and Applications. The three students spent the first term obtaining background knowledge in Invariant Theory, and then specialized to a specific application.

**As an instructor:**

2014: Durham University (in English)

- Michaelmas: *Coding Theory*, second year course, science students

I gave lectures ( $2 \times 50$ min/week), prepared fortnightly exercises, held fortnightly tutorials ( $3 \times 50$ min) and problem class (50min), and prepared the final evaluation.

2007: Royal Military College of Canada (in French)

- Fall: *Algèbre linéaire*, second year course, Science students
- Winter: *Équations différentielles, problèmes de conditions aux limites et fonctions d'une variable complexe*, third year course, Mechanical Engineering students

The military college is a bilingual university. In both cases, I taught the French language section of the course. I gave lectures (3h/week), prepared weekly exercises, and set the final exam.

**Undergraduate student tutoring:**

2017-2018: University of Nottingham (in English)

- 2017-2018: I was the tutor for a group of 6 first year students from the G100 course. As well as having a pastoral role, I lead weekly group tutorials for the three core courses (50min/week + 1-1 pastoral meetings twice a term).

**As a teaching assistant:**

2013: Durham University (in English)

- Michaelmas 2013: *Algebra II*, second year course for Mathematics students ( $4 \times 50$ min/fortnight), *Complex Analysis II*, second year course for Mathematics students ( $2 \times 50$ min/fortnight)

2010-2012: Universität Basel (in German)

- H2012: *Infinitesimal Rechnung I*, first semester course for Mathematics, Physics and Computer Science students. Tutorials (2h/week) and marking of weekly assignments.
- F2012: *Lineare Algebra II*, second semester course for Mathematics, Physics and Computer Science students. Tutorials (2h/week) and marking of weekly assignments.
- H2011: *Kommutative Algebra I*, master level course. Tutorials (2h/week) and marking of weekly assignments.
- F2011: *Topologie*, second and third year course for Mathematics students. Tutorials (2h/week) and marking of weekly assignments.
- H2010: *Lineare Algebra I*, first semester course for Mathematics, Physics and Computer Science students. Tutorials (2h/week) and marking of weekly assignments.

2003-2006: Queen's University (in English)

- 2005-2006:
  - *Algebraic Methods*, second year course for Science students. In addition to holding weekly tutorials (1h/week) and marking weekly assignments, I took part in an Teaching Apprenticeship program set up by the department. Among other activities, I held lectures during 2 weeks (3h/week) in the presence of the professor in charge of the course. He then made comments and suggestions to improve my teaching.
  - *Core Algebra I*, first part of a course which follows Serge Lang's *Algebra* aimed at graduate students in Mathematics. Marking of weekly assignments.
- 2004-2005:
  - *Introduction to Real Analysis*, second year course for students in Science and Engineering. Tutorials (1h/week) and marking of weekly assignments.
  - *Groups, Rings, and Fields*, third year course for Mathematics students. Marking of weekly assignments and tutorials (together with the professor) (1h/week).
  - *Vector Calculus*, integral and differential calculus in several variables for second year students in the sciences. Tutorials (2h/week) and marking of weekly assignments.
- 2003-2004:
  - *Complex Analysis*, second year course for students of Engineering. Marking of weekly assignments.
  - *Calculus II*, first year course for students of Engineering. Marking of weekly assignments and of the final written evaluation.
  - *Differential and Integral Calculus*, first year course. Weekly tutorials (2h/week)

2001-2003: Université Laval (in French)

- *Géométrie pour l'enseignement primaire et préscolaire*, Geometry for students in the primary education program. Tutorials (6h/week) and marking of partial evaluations (2 trimesters).
- *Arithmétique pour l'enseignement primaire et préscolaire*, Arithmetic for students in the primary education program. Tutorials (6h/week) and marking of partial evaluations (2 trimesters).
- Centre d'aide à l'apprentissage en Mathématiques et en Statistique (CDA). Students enrolled in Mathematics and Statistics course at Université Laval could visit the CDA to obtain individual help. (4 trimesters, about 10h/trimester)