

Dr. Carmen A. Bruni

CONTACT INFORMATION

Dr. Carmen A. Bruni
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RESEARCH INTERESTS

Mathematical Education. (Formerly, **Diophantine equations with a focus on elliptic curves and the modular method:** elliptic curves, elliptic curves with rational two torsion, Chabauty's method, modular forms, Hilbert modular forms, algebraic number theory, algorithm design.)

EDUCATION

University of British Columbia (UBC), Vancouver, BC

Ph.D., **Mathematics**

September 2010 - April 2015

- Thesis Topic: *Twisted Extensions of Fermat's Last Theorem*
- Advisor: **Professor Michael A. Bennett**
- Area of Study: Elliptic Curves, Modular Forms and Diophantine Equations

University of Waterloo, Waterloo, ON

MMATH, **Pure Mathematics**

September 2009 - August 2010

- Thesis Topic: *The Riemann-Roch Theorem*
- Advisor: **Professor David McKinnon**
- Area of Study: Algebraic Geometry

BMATH, **Double Major Pure Mathematics and Computer Science**

September 2005 - April 2009

- *With Distinction*, Dean's Honours List

PUBLICATIONS

- "Authentic Experiences in Two Mathematics Graduate Student Instructor Training Courses", (Carmen Bruni and Fok-Shuen Leung) - Submitted to For The Learning of Mathematics.
- "The Flourishing of Care in a Multidisciplinary Faculty Learning Community" (Julie A. Timmermans, Carmen Bruni, Rob Gorbet, Barbara Moffatt, Gordon Stubley, Diane Williams and Trevor Holmes) International Journal for Academic Development Volume 23 Issue 4 (2018), 367-373.

<https://www.tandfonline.com/doi/full/10.1080/1360144X.2018.1521335>

- "Sums of Two Cubes as Twisted Perfect Powers, Revisited", (Michael A. Bennett, Carmen Bruni and Nuno Freitas) - Algebra & Number Theory 12-4 (2018), 959-999. DOI 10.2140/ant.2018.12.959

<https://msp.org/ant/2018/12-4/index.xhtml>

- "From Exam to Education: The Math Exam/Educational Resources Wiki", (Carmen Bruni, Christina Koch, Bernhard Konrad, Michael Lindstrom, Iain Moyles, Will Thompson) - Published July 14, 2016, Volume 26 issue 7 in PRIMUS (Problems, Resources, and Issues in Mathematics Undergraduate Studies).

<http://www.tandfonline.com/eprint/avS8WHryamXqUUXhtfJE/full> }

- “Twisted Extensions of Fermat’s Last Theorem”. Thesis April 2015
(<https://open.library.ubc.ca/cIRcle/collections/ubctheses/24/items/1.0166239>)

AWARDS

· ACADEMIC

University of Waterloo

- MEF Funding for student hire for Math 135 Resources Page
April 2016 - March 2017

University of British Columbia

- UBC FL-TLEF Grant for the Math Educational Resources Wiki
June 2014 - August 2015
- Four Year Fellowship
September 2011 - August 2015
- NSERC CGS-M
September 2010 - August 2011

University of Waterloo

- Ontario Graduate Scholarship
September 2009 - August 2010
- President’s Graduate Scholarship
September 2009 - August 2010
- NSERC - USRA
May 2009 - August 2009
- Duke Energy Scholarship
September 2005 - April 2009
- Ronald G. Scoins National Scholarship
September 2005 - April 2009
- Canada Millennium Scholarship
September 2005 - April 2007
- President’s Scholarship
September 2005 - December 2005

· TEACHING

- Mathematics Department Graduate Teaching Award
Received an award from the University of British Columbia for excellence in teaching.
May 2013
- Killam Graduate Teaching Award
Received one of five prestigious Killam Graduate Teaching Assistant Award from the University of British Columbia awarded across all graduate students in the faculty of Science at UBC for my outstanding work as both an undergraduate instructor and teaching assistant.
April 2013
- Teaching Assistant Accreditation Program
Completed the Teaching Assistant Accreditation Program at UBC.
September 2010 - December 2012
- Outstanding Undergraduate Teaching Assistant
Received six outstanding teaching assistant evaluations from professors at the University of Waterloo for my role as a grader for various undergraduate courses given for timely return of assignments as well as constructive feedback.
September 2006 - April 2009

SELECTED TALKS

· ACADEMIC

- *Sage: An Open-Source Mathematical Software System*
Undergraduate Mathematics Colloquium at UBC
November 2014
- *Twisted Extensions of Fermat’s Last Theorem*
Canadian Number Theory Association (CNTA XIII), Ottawa
June 2014
- *Twisted Extensions of Fermat’s Last Theorem*
2014 Canadian Mathematical Society Summer Meeting, Winnipeg
June 2014
- *The Wonderful World of ~~Discy~~ Modular Forms*
Graduate Colloquium at UBC
March 2014
- *Twisted Extensions of Fermat’s Last Theorem*
CMS Winter Meeting Satellite Session, Montreal
December 2012
- *Techniques for Solving Diophantine Equations*
Graduate Colloquium at UBC
November 2012
- *An Introduction to Kolmogorov Complexity*
Undergraduate Mathematics Colloquium at UBC
February 2012

- *The Busy Beaver Function*
Graduate Colloquium at UBC **January 2012**
 - *Elliptic Curve Cryptography*
Graduate Mathematics Colloquium at the University of Waterloo **June 2010**
- EDUCATION
- *Lessons Learned from a Graduate Student Seminar*
2018 Canadian Mathematical Society Winter Meeting, Vancouver, British Columbia **December 2018**
 - *Online Adventures!*
2018 Canadian Mathematical Society Summer Meeting, Fredericton, New Brunswick **June 2018**
 - Fields Workshop Toronto, Ontario April 27th - April 29th 2018: *First Year University Mathematics Across Canada: Facts, Community and Vision* Invited workshop leader. **April 2018**
 - *Classroomless Classrooms*
2017 Canadian Mathematical Society Winter Meeting, Waterloo, Ontario **December 2017**
 - *Patterns and Sequences*
CEMC Math Teachers' Conference, Waterloo, Ontario **August 2017**
 - *Mathematical Housing: Downsizing a First Year Proofs Course*
2016 Canadian Mathematical Society Winter Meeting, Niagara Falls, Ontario **December 2016**
 - *Patterns and Sequences*
Grand River Valley Mathematics Association Meeting, Waterloo, Ontario **November 2016**
 - *Patterns and Sequences*
CEMC Math Teachers' Conference, Waterloo, Ontario **August 2016**
 - *The Math Exam/Educational Resources Wiki*
2014 Canadian Mathematical Society Winter Meeting, Hamilton, Ontario **December 2014**
 - *Solving America's Math Problem*
Teaching Seminar at UBC **November 2014**
 - *The Math Exam/Educational Resources Wiki*
Lunch Series Talks in Teaching at UBC **February 2014**
 - *Academic Motivation in Calculus*
Teaching Seminar at UBC **February 2014**
 - *Where Learning Starts? A Framework for Thinking About Lectures in University Mathematics*
Teaching Seminar at UBC **November 2013**
 - TAAP Beta Course
Lunch Series Talks in Teaching at UBC **March 2013**
- OUTREACH
- *Math 101 Day*
Annual Outreach Event, University of Waterloo **Each July 2015-Present**
 - *Careers in CS*
School Visits in Kingston **February 2019**
 - *March Break Open House Speaker*
Annual Outreach Event, University of Waterloo **March 2018**
 - *Fall Open House Speaker*
Annual Outreach Event, University of Waterloo **November 2017**
 - *Problem Solving Sessions*
CMS Toronto Math Camp **July 2017**
 - *Problem Solving Sessions*

	CEMC Toronto Math Camp	July 2017
	• <i>Problem Solving Sessions</i> School Visits in Calgary, Alberta	March 2017
	• <i>Math - What is it Good For?</i> TCDSBPD Day, Toronto, Ontario	February 2017
	• <i>Luhn's Algorithm</i> School Visit, University of Waterloo	January 2017
	• <i>Fractals and Python</i> School Visit, University of Waterloo	December 2016
	• <i>Mathematics in the Real World (Forecasting, Statistics and Compound Interest)</i> Math Circles University of Waterloo	October 2016
	• <i>Introduction to Graph Theory</i> Math 101 Day, University of Waterloo	July 2016
	• <i>Pell's Equations</i> School Visits in Winnipeg, Manitoba	March 2016
	• <i>Kolmogorov Complexity</i> EMACS, University of Waterloo	October 2015
	• <i>Congruent Number Problem (3 Part Series)</i> Math Circles University of Waterloo	October/November 2015
	• <i>Error Checking Codes</i> PC4G University of Waterloo	October 2015
POSTERS	• <i>The Math Exam/Educational Resources Wiki</i> 2014 Canadian Mathematical Society Winter Meeting in Hamilton	December 2014
	• <i>The Math Exam/Educational Resources Wiki</i> Flexible Learning Open House - Poster Session at UBC	June 2014
	• <i>The Math Exam/Educational Resources Wiki</i> CWSEI End-of-Year Event at UBC	April 2014
ORGANIZED CONFERENCES AND SEMINARS	<i>CNTA Organizer (Fields/University of Toronto)</i>	September 2018 - Present
	• Helping to organize a biannual Canadian number theory conference to be held in Toronto.	
	<i>Teaching Seminar (University of Waterloo)</i>	September 2015 - Present
	• Organized a set of seminar talks throughout the terms (excluding spring terms).	
	• Ran a lecture style seminar in Fall 2017 and Winter 2018 getting 12 speakers across all departments in mathematics.	
	• Led seminar on the book <i>How to Teach Mathematics</i> by Steven Krantz in Fall 2017 and Winter 2018.	
	• Led seminar on the book <i>Teach Like a Champion 2.0</i> by Doug Lemov in Fall 2016 and Winter 2017.	
	• Led seminar on the book <i>Make It Stick</i> by Peter C. Brown, Henry L. Roediger III , and Mark A. McDaniel in Winter 2016.	
	• Led discussions about assorted papers in mathematics education in Fall 2015.	
	<i>STEM Education Conference Volunteer</i>	July 2014
	• Set up and aided with take down of STEM Education Conference held at UBC.	
	<i>PIMS YRC Organizer</i>	September 2013 to June 2014
	• Organized PIMS Young Researchers Conference held on June 2-4, 2014 at UBC.	
	• Responsible for setting up food arrangements, securing funding and booking venues.	

Graduate Seminar in Algorithms

January 2014 to May 2014

- Organized and participated in a weekly algorithms seminar with fellow graduate students (between 10 and 20 per week).
- Programmed algorithms in Python.
- Completed weekly exercises inspired by the book Introduction to Algorithms by Cormen, Leiserson, Rivest and Stein.
- Created and released a cross platform cell phone game using Python and Kivy.

Teaching Assistant Accreditation Program (TAAP) Coach

January 2014 to April 2014

- Coached, with Vincent Chan, a team of six students a total of twelve hours a week through a series of activities geared towards improving teaching skills amongst graduate students.
- Suggested weekly activities and ensured completion of activities by the participants.

Elliptic Curves Seminar

January 2012 to April 2012

- Organized and participated in a weekly seminar about elliptic curves with fellow graduate students (between 10 and 15 per week).

TEACHING
EXPERIENCE

University of Waterloo, Waterloo, ON

Instructor

September 2015 - present

Served as an instructor for the Faculty of Mathematics (from 2015) and as a Computer Science academic advisor (as of May 2018)

- CS (Teaching Average 4.53 across 12 completed courses)
 - Instructor for CS 241: Foundations of Sequential Programs. (January-April 2019)
 - Taught two sections of 76 and 79 students introductory compilers course.
 - Instructor for CS 116: Introduction to Computer Science 2. (January-April 2017 and 2019)
 - Taught three sections of 90 students introductory Python.
 - Instructor for CS 245: Logic and Computation. (May-December 2018)
 - Taught five sections of sizes 35, 40, 43, 89 and 90 introductory Logic
 - Instructor for CS 137: Programming Principles. (September-December 2017 and 2018)
 - Taught two sections of sizes 122 and 140 introductory programming in C.
 - Instructor for CS 136: Elementary Algorithm Design and Data Abstraction . (January-April 2018)
 - Taught three sections of sizes 61, 67, 76 introductory programming in C.
- MATH (Teaching Average 4.46 across 6 completed courses)
 - Instructor for MATH 135: Algebra for Honours Mathematics. (September-December 2016, 2015 and January-April 2016)
 - Teaching 2 classes per term of 60 students proofs and number theory. (Total of 6 classes)
 - Creator and curator of the Unofficial Math 135 Resources Page found at (<http://www.cemc.uwaterloo.ca/~cbruni/Math135Resources/index.php>)
- CO (Teaching Average 3.57 from CO 480)
 - Instructor for CO 480: History of Mathematics. (Scheduled May-August 2017)
 - Redesigned and taught a course in History of Mathematics - geared more towards Number Theory concepts.
 - Co-Instructor for CO 380: Problem Solving Strategies. (May-August 2016)

- Taught one fifth of course of 60 students problem solving strategies (factoring, inequalities and functional equations).
- Teaching evaluations for this course are not available.

Langara College, Vancouver, BC

Instructor **January 2015 - April 2015**

- Instructor for MATH 1174: Calculus I - Economic and Business Applications.
 - Taught 38 students differential calculus with business applications.
 - Created assignments and midterms for evaluations.

University of British Columbia, Vancouver, BC

Instructor **January 2015 - April 2015**

- Instructor for MATH 210: Introduction to Mathematical Computing.
- Teaching evaluation score of 3.8/5.0.
 - Students used Python and Sage via Sage Math Cloud to solve mathematical problems using a computer.
 - Created assignments, midterms and final examination for the single section course of 55 students.

Teaching Assistant **September 2014 - December 2014**

- Teaching assistant for MATH 102: Differential Calculus with Applications to Life Sciences.
 - Maintained WebWork assignments and course wiki.
 - Graded midterms for the course.

Instructor **January 2014 - April 2014**

- Instructor for MATH 103: Integral Calculus with Applications to Life Sciences (85 students).
- Teaching evaluation score of 4.7/5.0.
 - Wrote a syllabus for the course found at (<https://github.com/cbruni/MATH-103-Syllabus-UBC->)
 - Created a series of videos and pencasts which are available at (<http://wiki.ubc.ca/Science:Math Exam Resources>) or on my home webpage.

Workshop Facilitator **September 2013 - December 2013**

- Workshop facilitator for MATH 180: Differential Calculus with applications to Physical Sciences.

Online Educational Resource **August 2013**

- Created and modified HTML and JavaScript webpages to assemble a precalculus resource for incoming students at UBC.

Instructor **January 2013 - April 2013**

- Instructor for MATH 103: Integral Calculus with Applications to Life Sciences (85 students).
- Teaching evaluation score of 4.4/5.0.

Workshop Facilitator **September 2012 - December 2012**

- For MATH 180 and MATH 184: Differential Calculus with applications to Business and Commerce.

Instructor **January 2012 - April 2012**

- Instructor for MATH 101: Integral Calculus with Applications to Physical Sciences and Engineering (80 students).
- Teaching evaluation score of 4.7/5.0.

Teaching Assistant - Tutor **September 2011 to December 2011**

- Tutored in the tutorial centre for first and second year mathematics courses

Teaching Assistant - Grader **January 2011 to April 2011**

- Graded for MATH 313: Topics in Number Theory for **Professor Vinayak Vatsal**

Teaching Assistant - Tutor **September 2010 to December 2010**

- Tutored in the tutorial centre for first and second year mathematics courses and held office hours for MATH 180, Differential Calculus with Physical Applications, taught by **Professor Rajiv Gupta**.

University of Waterloo, Waterloo, ON

Teaching Assistant - Tutorial Instructor **January 2010 to April 2010**

- Mini-session instructor for MATH 118: Calculus 2 for Engineering

Teaching Assistant - Tutor **September 2009 to December 2009**

- Tutor for MATH 135: Algebra for Honours Students

Undergraduate Teaching Assistant - Grader **September 2006 to April 2009**

PROFESSIONAL
SERVICE

Crux Magazine

Crux Mathematicorum Editor **July 2015 - December 2017**

- Editor for the Olympiad Corner section of Crux Magazine.

University of Waterloo, Waterloo, ON

Resource Webpages **August 2015 - Present**

- Visit my home webpage:

<https://cs.uwaterloo.ca/~cbruni/>

for more details. Created several resource pages for MATH 135, CS 116, CS 136, CS 137, CS 245, CS 241 and CO 480 for students to aid with course content.

School Visits **August 2015 - Present**

- Various visits to high schools to ignite student interest in mathematics.
- Give presentations and problems sets to prospective students.

Open House Events **August 2015 - Present**

- Participated in MATH 101, Fall and March Open House Events.
- Gave talks to prospective students.

Academic Advising **May 2018 - Present**

- Hold office hours on average 2-3 times a month to help students with course decisions.
- reply to emails in a prompt manner answer student inquiries.

Contest Committees **August 2015 - August 2017**

- Member of the Canadian Senior Mathematics Contest creation committee
- Validator for the Fryer, Galois and Hypatia contests, Pascal, Cayley, Fermat and Euclid contests and for the Canadian Team Mathematics Contest.
- Validator for the Beaver Computing Challenge, the Canadian Computing Competition and the Canadian Computing Olympiad.

Euclid Contest Grader **April 2016-Present**

- Annual grading of a subset of the 19000+ papers received for the Euclid contest.

Canadian Senior Mathematics Contest (CSMC) Grader

December 2015-Present

- Annual grading of a subset of the 10000+ papers received for the CSMC contest.

University of British Columbia, Vancouver, BC

Math Exam/Educational Resources Wiki **March 2012 to April 2015**

- Wrote solutions for a free resource for students to receive help with exam problems for first and second year mathematics courses via the MediaWiki software.
- Organized content and developing digital content such as pencasts for the resource.
- Wrote grant proposals and giving talks and poster sessions on the resource.
- Worked as a team to provide students with a easy to navigate learning resource.
- For more information, visit the Math Exam/Educational Resources Wiki found at (<http://wiki.ubc.ca/Science:Math Exam Resources>)

Math Mania Volunteer **November 2014**

Math Liaison **September 2013 to August 2014**

- Acted as mediator and bridged communication lines between the mathematics graduate students at UBC and the math club at UBC.

UBC Killam Award Committee Member **September 2013 to March 2014**

- Helped choose prestigious Killam award winners for outstanding educators.
- Visited nominees' lectures and evaluated teaching performances.
- For more information, visit (<http://science.ubc.ca/faculty/awards/killam>)

Canadian Open Mathematics Competition Marking **December 2013**

UBC Job Fair Volunteer **November 2013**

Canadian Open Mathematics Competition Marking **December 2012**

Euclid Day **May 2012**

Euclid Contest Marking **April 2012**

PROFESSIONAL
EXPERIENCE

Private Tutor **January 2013-April 2015**

University of Waterloo, Waterloo, ON

Undergraduate Researcher - USRA **May 2009 - August 2009**

- Funding: **NSERC - USRA** and **University of Waterloo - Department of Combinatorics and Optimization**
 - “Knot Invariants, Turaev’s Theorem and Khovanov Homology”
 - Supervisor: **Professor David M. R. Jackson**
- Studied knot theory and investigated properties of knot invariants.
- Studied the categorification of the Jones polynomial knot invariant in terms of Khovanov homology.

- HARDWARE AND SOFTWARE SKILLS
- Computer Programming:
- (Current familiarity) C, C++, Python, Sage, Magma MediaWiki
 - (Past familiarity) Maple, Java, MATLAB, Mathematica.
- Productivity Applications:
- \LaTeX (\LATEX , \BIBTEX), most common productivity packages for Windows
- CONFERENCES AND WORKSHOPS ATTENDED
- 2018 CMS Winter Meeting (Vancouver, British Columbia) **December 2018**
 - CoMInDS Summer Workshop - Improving the Preparation of Graduate Students to Teach Undergraduate Mathematics (Orono, Maine) **July 2018**
 - 2018 CMS Summer Meeting (Fredericton, New Brunswick) **June 2018**
 - First Year University Mathematics Across Canada: Facts, Community and Vision-Invited workshop leader (Toronto, Ontario) **April 2018**
 - 2017 CMS Winter Meeting (Waterloo, Ontario) **December 2017**
 - CEMC Math Contest Conference (Kitchener, Ontario) **February 2017**
 - 2016 CMS Winter Meeting (Niagara Falls, Ontario) **December 2016**
 - Grand River Valley Mathematics Association Meeting (Waterloo, Ontario) **November 2016**
 - CEMC Math Contest Conference (Kitchener, Ontario) **November 2016**
 - CEMC Math Teachers' Conference (Waterloo, Ontario) **August 2016**
 - 2016 Bebras BCC Conference (Bodrum, Turkey) **May 2016**
 - CEMC Math Contest Conference (Kitchener, Ontario) **February 2016**
 - CEMC Math Contest Conference (Kitchener, Ontario) **November 2015**
 - CEMC Math Teachers' Conference (Waterloo, Ontario) **August 2015**
 - CEMC CS Teachers' Conference (Waterloo, Ontario) **August 2015**
 - 2014 CMS Winter Meeting (Hamilton, Ontario) **December 2014**
 - STEM Education and Our Planet(Vancouver, British Columbia) **July 2014**
 - 13th Conference of the Canadian Number Theory Association (Ottawa, Ontario) **June 2014**
 - 2014 CMS Summer Meeting (Winnipeg, Manitoba) **June 2014**
 - 11th PIMS Young Researchers Conference (Vancouver, British Columbia) **June 2014**
 - Pacific Northwest Number Theory Conference (Burnaby, British Columbia) **May 2014**
 - Pacific Northwest Number Theory Conference (Seattle, Washington) **June 2013**
 - CMS Winter meeting (Montreal, Quebec) **December 2012**
 - Riemann Zeta Function Workshop (Burnaby, British Columbia) **November 2012**
 - Canadian Number Theory Association XII Meeting (Lethbridge, Alberta) **June 2012**
 - BIRS Summer School: Contemporary methods for solving Diophantine equations (Banff, Alberta) **June 2012**
 - Software Carpentry (Vancouver, British Columbia) **May 2012**
 - Pacific Northwest Number Theory Conference (Moscow, Idaho) **May 2012**
 - Automorphic Forms Workshop (Vancouver, British Columbia) **April 2012**
 - CMS Winter meeting (Toronto, Ontario) **December 2011**
 - Tate's Thesis Seminar (Vancouver, British Columbia) **August 2011**
 - Instructional Skills Workshop (Vancouver, British Columbia) **December 2010**

REFERENCES AVAILABLE TO CONTACT

- Lori Case** (e-mail: lori.case@uwaterloo.ca; phone: +1-519-888-4567 x34452)
- Lecturer in Computer Science, Department of Computer Science, University of Waterloo
 - ◊ 200 University Ave W Waterloo, Ontario, N2L 3G1 Canada
 - ★ *Professor Case was a co-lecturer in CS 116*
- Brian Forrest** (e-mail: beforres@uwaterloo.ca; phone: +1-519-888-4567 x33484)

- Professor in Pure Mathematics, University of Waterloo,
Pure Mathematics, University of Waterloo
- ◇ 200 University Ave W Waterloo, Ontario, N2L 3G1 Canada
- ★ *Brian Forrest is a colleague I have spent much time with discussing the aspects of teaching.*

J.P. Pretti (e-mail: jpretti@uwaterloo.ca; phone: +1-519-888-4567 x36477)

- Lecturer for the Centre for Education in Mathematics and Computing,
Centre for Education in Mathematics and Computing, University of Waterloo
- ◇ 200 University Ave W Waterloo, Ontario, N2L 3G1 Canada
- ★ *Professor Pretti was the course coordinator for Math 135 during the 6 times I taught the course and is currently a co-lecturer in CS 116.*