

# Courtney R. Gibbons

## Curriculum Vitæ

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## Employment

<b>Associate Professor</b> , Department of Mathematics and Statistics, Hamilton College	JUL 2019-PRESENT
<b>Adjunct Professor</b> , Mohawk Correctional Campus, Herkimer College	SU 2019
<b>Assistant Professor</b> , Department of Mathematics, Hamilton College	JUL 2013-2019
<b>Paraprofessional</b> , Department of Math and Computer Science, The Colorado College	AY 2006-07

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## Education

<b>Ph.D. Mathematics</b> , University of Nebraska–Lincoln Thesis Advisors: Luchezar L. Avramov and Roger Wiegand Thesis Title: <i>Decompositions of Betti Diagrams</i>	AUG 2013
<b>M.S. Mathematics</b> , University of Nebraska–Lincoln	MAY 2009
<b>B.A. Mathematics</b> , The Colorado College; <i>Summa Cum Laude</i> with Distinction in Mathematics	MAY 2006

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## Research Interests

Commutative algebra: properties of infinite free resolutions and factorization in semigroups;  
Algebraic statistics: toric varieties of maximum likelihood equations.

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## Professional Memberships and Honor Societies

American Association of University Professors (AAUP), Association for Women in Mathematics (AWM), Mathematics Association of America (MAA), Society for Industrial and Applied Mathematics (SIAM), National Association of Mathematicians (NAM), Golden Key Honor Society, Phi Beta Kappa ( $\Phi$ BK)

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## Research

(\* indicates an undergraduate coauthor)

## Published and Accepted Work

**Article.** *L-dimension for modules over a local ring*, with D. Jorgensen and J. Striuli (To Appear, American Mathematical Society Monographs, Commutative Algebra: 150 years with Roger and Sylvia Wiegand).

**Article.** *Nearly complete intersection hypergraphs*, with C. Bondi\*, Y. Ke\*, S. Martin\*, S. Pothagoni\*, and A. Stelzer\* (To Appear, Springer AWM Volume for Women in Commutative Algebra). Preprint: [arXiv:2101.08401](https://arxiv.org/abs/2101.08401)

**Article.** *Realizable divisor sequences for atoms in Krull monoids*, with N. Baeth, T. Bell, and J. Striuli (To Appear, J. Commut. Algebra). Preprint: [arXiv:1911.03566](https://arxiv.org/abs/1911.03566)

**Article.** *Recursive strategy for decomposing Betti tables of complete intersections*, with R. Huben\* and B. Stone. Internat. J. Algebra Comput. 29 (2019), no. 7, 1165–1191. [MR4022702](https://doi.org/10.1112/S1074748019500270)

**Article.** *Maximum likelihood degree of toric varieties*, with C. Améndola, N. Bliss, I. Burke, M. Helmer, S. Hoşten, E. Nash, J. Rodriguez, D. Smolkin. J. Symbolic Comput. 92 (2019), 222–224. [MR3907355](https://doi.org/10.1016/j.jsc.2019.05.005)

**Article.** *Rational combinations of Betti diagrams of complete intersections*, with M. Annunziata\*, C. Hawkins\*, and A. Sutherland\*. J. Algebra Appl. 17 (2018), no. 5. [MR3795374](https://doi.org/10.1142/S1743293318500374)

**Article.** *Critical Pebbling Numbers of Graphs*, with J. D. Laison and E. J. Paul. J. Combin. Math. Combin. Comput. 99 (2016), 199–224. [MR3585742](https://doi.org/10.1112/jlms.12142)

**Code.** *BoijSoederberg.m2*, package reviser with B. Stone; incorporated in Macaulay2-v1.8.2, April 13, 2015.

**Article.** *Grandma Makes Granola*, with R. Bedient. *College Math. J.* 46 (2015), no. 1, pp. 58-60.

**Article.** *Non-simplicial decompositions of Betti diagrams of complete intersections*, with J. Jeffries, S. Mayes, C. Raicu, B. Stone, and B. White. *J. Commut. Algebra* 7 (2015), no. 2, 189–206. [MR3370483](#)

**Thesis.** *Decompositions of Betti diagrams*. ProQuest LLC, Ann Arbor, MI, 2013. Thesis (Ph.D.); University of Nebraska–Lincoln.

**Article.** *The cone of Betti diagrams over a hypersurface ring of low embedding dimension*, with C. Berkesch, J. Burke, and D. Erman. *J. Pure Appl. Algebra* 216 (2012), no. 10, 2256–2268. [MR2925819](#)

**Article.** *Fixing numbers of graphs and groups*, with J. D. Laison. *Electron. J. Combin.* 16 (2009), no. 1, Research Paper 39, 13 pp. [MR2491641](#)

## Work in Preparation

**Code.** *NCAAlgebra.m2*, package author with A. Conner and W. F. Moore (In Progress).

**Article.** *Betti tables over short Gorenstein algebras*, with L. Avramov and R. Wiegand (In Progress).

**Article.** *Short and stretched Gorenstein rings*, with B. Stone (In Progress).

## Conference Talks

(† indicates an invited talk; \* indicates an upcoming talk)

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| <b>1167th AMS Meeting</b> Special Session on Commutative Algebra†<br>San Francisco, CA (Online)<br><i>A Hypergraph Characterization of Nearly Complete Intersections</i>   | MAY 2021 |
| <b>1150th AMS Meeting</b> Special Session on Commutative Algebra:<br>in Celebration of the 150th Birthday of Roger and Sylvia Wiegand †<br>University of Wisconsin-Madison, Madison, WI<br><i>Realizing Divisor Sequences in Krull Monoids</i>   | SEP 2019 |
| <b>MathFest:</b> Commutative Algebra Special Session†<br>Cincinnati, OH<br><i>Syzygy - When Submodules Align</i>   | AUG 2019 |
| <b>Joint Mathematics Meetings (JMM):</b> Special Session on Commutative Ring Theory:<br>Research for Undergraduate and Early Graduate Students Special Session †<br>Baltimore, MD<br><i>Boij-Söderberg theory as an introduction to research in commutative algebra</i>                                  | JAN 2019 |
| <b>Route 81 Conference</b><br>Syracuse University, Syracuse, NY<br><i>Recursive strategy for decomposing Betti diagrams of complete intersections</i>  | SEP 2018 |
| <b>SIAM Applied Algebraic Geometry Meeting:</b> Maximum Likelihood Degree Minisymposium †<br>Georgia Institute of Technology, Atlanta, GA<br><i>Maximum Likelihood Degrees for Discrete Random Models</i>  | AUG 2017 |
| <b>Second International Workshop and Conference on Commutative Algebra</b> †<br>Tribhuvan University, Kathmandu, Nepal<br>Preparatory Workshop Talk: <i>Graded Rings, Graded Modules, and Numerical Invariants</i><br>Research Conference Talk: <i>Short Gorenstein Rings: Numerics and Consequences</i> | OCT 2016 |
| <b>Joint Mathematics Meetings (JMM):</b> Commutative Algebra Special Session †<br>Seattle, WA<br><i>A ring without a Boij-Söderberg theory</i>   | JAN 2016 |
| <b>MathFest:</b> Concrete Computations in Algebra and Algebraic Geometry Invited Paper Session †<br>Washington, DC<br><i>The search for indecomposable modules</i>   | AUG 2015 |
| <b>1092nd AMS Meeting</b> Special Session on Commutative Algebra †<br>University of Louisville, Louisville, KY   | OCT 2013 |

*Non-simplicial decompositions of Betti diagrams of complete intersections*

**1085th AMS Meeting** Special Session on Commutative Algebra † OCT 2012  
University of Arizona, Tucson, AZ  
*Modules over short Gorenstein rings*

**JMM: AMS Contributed Papers Session** JAN 2013  
San Diego, CA  
*Modules over short Gorenstein rings*

**1074th AMS Meeting:** Special session on Commutative Algebra † OCT 2011  
University of Nebraska–Lincoln, Lincoln, NE  
*New directions in Boij–Söderberg theory*

## Research Seminar Talks

**University of Nebraska–Lincoln, Commutative Algebra Seminar**  
*A Ring without a Boij–Söderberg Theory* FEB 2017  
*Boij–Söderberg Theory I: Betti diagrams over polynomial rings* SEP 2010  
*Boij–Söderberg Theory II: Betti diagrams over  $k[x, y]/(x^2)$*  SEP 2010

**Williams College, Faculty Research Seminar** NOV 2016  
*Representations of Kronecker Quivers*

**Syracuse University, Algebra Seminar** MAR 2015  
*Parametrizing a family of indecomposable modules*

**University of Utah, Algebra Seminar** MAR 2012  
*Decomposition of Betti diagrams over a quadric hypersurface*

**University of Texas at Arlington, Algebra Seminar** MAR 2012  
*Betti diagrams over a small hypersurface*

**University of Nebraska–Lincoln, Commutative Algebra Reading Seminar** 2008-13  
**University of Nebraska–Lincoln, Graduate Student Seminar** 2008-12

## Posters

**JMM: AWM Workshop poster session** JAN 2013

**JMM: Undergraduate research poster session** JAN 2007

## Selected Workshops, Conferences, and Summer Schools

**Institute for Advanced Study: Park City Mathematics Institute, Park City, UT**  
Undergraduate Faculty Program JUL 2018

**Banff International Research Station, Banff, Alberta, CA**  
New Trends in Syzygies JUN 2018

**Georgia Institute of Technology**  
Applied Macaulay2 Tutorial JUL 2017

**American Mathematical Society: Mathematics Research Community**  
Algebraic Statistics JUL 2016  
Commutative Algebra JUL 2010

**Mathematical Sciences Research Institute**  
Macaulay2 Workshop JAN 2014  
Joint Introductory Workshop: Cluster Algebras and Commutative Algebra AUG 2012  
Summer Graduate School on Commutative Algebra JUN 2011

**The Colorado College**  
Macaulay2 Workshop AUG 2010

**The Abdus Salam International Center for Theoretic Physics, Trieste, Italy**  
School on Commutative Algebra and Interactions with Algebraic Geometry and Combinatorics SU 2010

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## Teaching

### Professional Teaching Experience

#### Research Supervisor

Clemson University  
[COURAGE Research Experience for Undergraduates](#)  
 Willamette University  
[WVMC Research Experience for Undergraduates](#)  
 Hamilton College  
 Physics, Mathematics, and Music [with K. Brown]  
 DEAN 500 Senior Fellowship

#### Instructor of Record

##### Hamilton College

MATH 113 Calculus I  
 MATH 116 Calculus II  
 MATH 224W Linear Algebra  
 MATH 325W Modern Algebra  
 MATH 327 Cryptography  
 MATH 361 Number Theory with Applications  
 MATH 450 Independent Study  
 MATH 525 Computational Algebra

##### University of Nebraska–Lincoln

MATH 101 College Algebra  
 MATH 203 Contemporary Mathematics  
 MATH 300 Mathematics Matters [for future elementary educators]

##### All Girls/All Math

Codes and Cryptology

#### Guest Lecturer

##### Hamilton College

COLLEGE 371 Common Seminar Adirondacks Program  
 HSPST 370 Postmodern Spain: New Narratives and New Technologies

#### Graduate Teaching Assistant

##### University of Nebraska–Lincoln

MATH 806T Number Theory & Cryptology  
 MATH 811T Functions for Precalculus Teachers (Online)  
 MATH 805T Discrete Math & Combinatorics  
 Super-TA for all Calculus Courses

## Pedagogical Engagement

**Team-Based Inquiry Learning Fellow**, Calculus 1 Cohort JUL 2021  
 University of South Alabama

#### Webinars and Online Trainings

*Mastery Grading Conference*, Online (14 hours) MAY 2021  
*PEDESTALS 2: Teaching Mathematics Remotely and Doing It Well*, College Bridge (8 hours) SU 2020  
*Embodying Liberatory Practices in the Classroom*, NYU Metro Center (1.5 hours) JUN 2020  
*Mastery Grading Conference*, Grand Valley State University (14 hours) MAY 2020

#### Mathematical Association of America Minicourse

Alternative Grading AUG 2019  
 Flipping the Classroom JAN 2015

#### AHA! Group

Member; Race, Pedagogy, and Building an Antiracist Institution AY 2020-21  
 Member; Research Advising in Virtual Environments AY 2020-21

Attendee; Active Learning in STEM	SP 2020
Member; Decolonizing Education	AY 2018-19
<b>Why I Teach</b>	
Speaker; “Surprise, Satisfaction, and Joy”	DEC 2018
<b>Curricular Development</b>	
Math Department SSIH requirement	SU 2016
<b>Talking About Teaching</b>	
Panelist; Ada Lovelace Celebration	OCT 2018
Speaker; Inclusive Pedagogies: Teaching a Diverse Student Body	APR 2016
<b>Consortium on High Achievement and Success (CHAS) Grant</b>	
Alumna participant	SP 2017
Faculty Development on Teaching Diverse First-Year Students	SP 2016
<b>Hamilton College DOF Reading Discussions</b>	
Book: <i>What the Best College Teachers Do</i>	SU 2014
Book: <i>Teaching Naked</i>	SU 2015

## Undergraduate Seminar Talks

Ithaca College Math Department Colloquium	FEB 2021
Connecticut College Senior Seminar	FEB 2021
Denison University Math and CS Colloquium	OCT 2019
Sacramento State Math Club & ANTC Colloquium	MAR 2017
Williams College AWM Student Chapter Kick-Off Talk	FEB 2017
Utica College Math Colloquium	FEB 2017
Adelphi University Math and Comp Sci Seminar	MAR 2015, SEP 2016
Hampshire College HCiSSM “Prime Time”	AUG 2013
Williams College Mathematics Seminar	JAN 2013
Bard College Mathematics Seminar	NOV 2012
William Jewell College Pi Mu Epsilon Colloquium	NOV 2012
The Colorado College Mathematics Seminar	APR 2010

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## Service

### To the Profession

#### Association for Women in Mathematics Roles and Activities

<b>Task Force Member</b> , Noether Lecture Replacement at Joint Mathematics Meeting 2021	FA 2020
<b>Session Organizer</b> , Association for Women in Mathematics Panel - Equity, Ethics, and Bias in Mathematics, Joint Mathematics Meeting	FA 2020
<b>Chair</b> , <a href="#">Committee on Policy and Advocacy</a>	NOV 2019-20
<b>Committee Member</b> , <a href="#">Committee on Policy and Advocacy</a>	JAN 2018-20

#### Session Organizer

JMM, Atlanta, GA	JAN 2017
<a href="#">Commutative Algebra: Research for Undergraduate and Early Graduate Students (Special Session #8)</a>	
<b>1115th AMS Meeting</b> , Rutgers University, New Brunswick, NJ	NOV 2015
<a href="#">Special Session on Aspects of Resolutions and Syzygies in Commutative Algebra</a>	

#### Panelist

<b>Nebraska Conference for Undergrad. Women in Math (NCUWM)</b> ; “Random Bits of Advice”	FEB 2017
<b>JMM</b> : Joint Committee on Women in Mathematical Sciences; “Success in Graduate School”	JAN 2016
<b>MathFest</b> : Association for Women in Mathematics; “Mentoring Matters”	JUN 2014

#### Referee/Reviewer

<i>Amer. Math. Monthly</i>	
<i>J. Commut. Algebra</i>	
<i>J. Algebra Appl.</i>	
<i>Mathematical Reviews</i>	
<i>Minnesota J. of Undergrad. Math.</i>	

*Comm. Algebra*

**Co-Founder, Co-Organizer, Co-PI**

KUMUNUjr Conference

2012-13

**Table Host**

NCUWM

2010-13

## To Hamilton College

**Committee Member**

Committee on Academic Policy

FA 2019-PRESENT

Committee on Academic Policy SmartCatalog Team

FA 2020-PRESENT

Middle States Standard VII Working Group

FA 2019-20

Quantitative and Symbolic Reasoning Advisory Committee

FA 2018-PRESENT

Dean of Faculty Search Committee

FA 2017

Writing Advisory Committee

FA 2017-19

Honor Court

AY 2014-16

**Service to Phi Beta Kappa (Epsilon of New York)**

President

AY 2017-20

Vice President

AY 2014-16

Committee on selection criteria

SP 2014

Member

2013-PRESENT

**Calculus Czar**

Hamilton Math Department

FA 2017-PRESENT

**Representative**

Liberal Arts Consortium for Online Learning

FA 2017-18

**Consultant**

Counseling Center usage statistics and projections for David Walden

FA 2016

**Focus Group Member**

Ellucian advising tool for Registrar's Office

FA 2016

**Faculty Advisor**

Hamilton College Student Chapter of the Association for Women in Mathematics

FA 2017-PRESENT

Hamilton College Vegan Club

AY 2014-15, 2017-PRESENT

**Mathletics Coach (Putnam Team)**

with Prof. Andrew Dykstra

FA 2013, FA 2014

**Caucus Participant**

Junior Faculty Caucus

AY 2014-18

**Academic Advisor**

AY 2014-PRESENT

**Bristol Project Mentor, ×2**

JAN 2020

## To University of Nebraska–Lincoln

**UNL Workshop for Graduate TAs** Orientation Leader, Panelist

2010, 2011, 2012

**UNL Annual Math Day** volunteer

FA 2007-12

**UNL Math Graduate Student Advisory Board** representative

AY 2007-09

## Outreach

### Educational Presentations

**The Other Side** Utica, NY

*The Mathematics of Online Privacy*

APR 2021

*Gerrymandering: Hijacking Democracy One Non-Convex Region at a Time*

OCT 2018

*The Mathematics of Climate Change*

OCT 2015

**Talk Math with your Friends** Online Colloquium Series

The Real Friends are the Betti Numbers We Calculated Along the Way

OCT 2020

**Institute for Advanced Study: Park City Mathematics Institute** Park City, UT

<b>Ignite Talk</b> From Zero to Syzygy in Five Minutes	JUL 2018
<b>The Arthur Levitt Public Affairs Center</b> <i>Gerrymandering: The Math Behind the Madness</i>	APR 2018
<b>Hamilton College</b> Days-Massolo Center “What is...?” series <i>What is... Gerrymandering?</i>	OCT 2018
The Card Catalog Project <i>Googling It: How Google Ranks Search Results</i>	OCT 2017
Emmerson Literary Society <i>Sudoku, Apes, and Algebra: An ELS “Tell Us What You Know” Lecture</i>	FA 2015
Sigma Xi Colloquium <i>Syzygy: Understanding Relationships among Polynomials</i>	SP 2014

## Community Engagement

<b>Creator</b> , <a href="#">YouTube Channel</a>	PRESENT
<b>Coordinator and co-PI</b> , Math Chairs for Racial Justice	JUL 2021
<b>Facilitator</b> , Math Chairs for Racial Justice	JUL 2020, 2021
<b>Penpal</b> , <a href="#">Prison Mathematics Project</a> (connecting incarcerated folks to math mentors) – 3 penpals	2020-PRESENT
<b>Web Design Team Member</b> , <a href="#">covidep.org</a> (a COVID-19 protocol sharing site)	SP 2020
<b>Judge</b> , Pfizer–Novartis–LPS Science Fair	2010, 2012
<b>Classroom Leader</b> , Saturday Science at UNL	FEB 2010

## In the Media

### In Print

<i>American Mathematical Society</i> page-a-day calendar illustration (Left-Handers Day)	AUG 2020
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### Interviews

<i>My Favorite Theorem</i> math podcast <a href="#">Episode 45: Your Flash Favorite Theorems</a> (timestamp 3:48)	AUG 2019
<i>Roots of Unity</i> Scientific American blog “shout out” in <a href="#">Mathematical Mondegreens</a>	AUG 2019
<i>Chronicle of Higher Ed Teaching Newsletter</i> , 10/5/17	OCT 2017
<i>Relatively Prime</i> math podcast <a href="#">Diegetic Plots: Chapter 2</a>	FEB 2016
<i>Girls’ Angle Bulletin</i> volume 8, no. 3-4	FEB 2015, APR 2015

### Guest Columns

<i>The Global Math Department Newsletter</i> <a href="#">An AMC for the Mathematics Community</a> (with B. Fantechi, M. VanDieren)	FEB 2021
<a href="#">Liberatory Mathematics for breaking out of jail</a>	FEB 2021
<i>AMS Notices</i> Early Career column (upcoming)	MAY 2020
<i>AWM Newsletter</i> volume 49, no. 1: <a href="#">New NSF Funding Requirements</a>	JAN 2019
<i>Girls’ Angle Bulletin</i> volume 10, no. 5: <a href="#">Errorbusters</a>	JUN 2017
<i>AMS e-Mentoring Network Blog</i> : <a href="#">The Four Parts of No</a>	JUN 2017
<i>Math Babe</i> <a href="#">mathbabe.org</a>	FEB 2015

### Actor

Mathematically Bent Theater at JMM	JAN 2014, JAN 2015, JAN 2017
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## Awards, Fellowships, and Affiliations

<b>Partner</b> , Institute for the Quantitative Study of Inclusion, Diversity, and Equity (QSIDE)	2020
<b>The John R. Hatch Class of 1925 Excellence in Teaching Award</b> , Hamilton College	2015
<b>Project NExT Fellow</b> , Mathematical Association of America	2013
<b>Outstanding Graduate Teaching Assistant</b> , UNL College of Arts and Sciences	2011
<b>Emeritus Faculty Fellow</b> , UNL Department of Mathematics	2010
<b>Graduate Fellowship</b> , UNL College of Arts and Sciences	2009
<b>Outstanding Qualifying Exams</b> , UNL Department of Mathematics	2008
<b>Florian Cajori Prize in Mathematics</b> , The Colorado College	2006

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## Grant-Supported Activity

Macaulay2 Virtual Workshop, NSF Grant #DMS-2003883	SU 2020
Noncommutative Algebra, Emerson Project Advisor	SU 2019
Discovery-Based Algebra Activities, Hamilton Class of 1966 Career Development Award	SU 2016
WMC REU Research Mentor, NSF Grant #DMS-1460982	SU 2015
KUMUNUjr Co-PI, NSF Grant #DMS-1303248	SP 2013
Graduate Researcher, NSF Grant #DMS-1103176	SP 2012
GAANN Trainee, DOE Grant #200A90002	AY 2010
NebraskaMATH Assistant, NSF Grant #DUE-1035268	SU 2011, SU 2012, FA 2012
Project Fulcrum Resident Scientist, NSF Grant #DGE-0086358	AY 2009-10
MCTP Trainee, NSF Grant #DMS-0838463	AY 2007-08