

# Curriculum Vitae — David Brian Walton

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## Correspondence:

Department of Mathematics and Statistics  
MSC 1911, Room 115A  
James Madison University  
Harrisonburg, VA 22807

email: waltondb@jmu.edu  
office: (540) 568-6387  
fax: (540) 568-6857

## Education:

- Ph.D. in Applied Mathematics (2002)  
The University of Arizona, Tucson, AZ  
Dissertation: “Analysis of Single-Molecule Kinesin Assay Data by Hidden Markov Model Filtering”
- M.S. in Applied Mathematics (1998)  
The University of Arizona, Tucson, AZ
- B.S. in Mathematics (1996)  
Brigham Young University, Provo, UT  
University Honors and Honors in Mathematics  
Thesis: “Decomposition of the Regular Representation of  $D_n$ ”

## Appointments:

- **James Madison University**, Harrisonburg, VA. Professor, Department of Mathematics and Statistics, Fall 2015-present.
- **James Madison University**, Harrisonburg, VA. Associate Professor, Department of Mathematics and Statistics, Fall 2009-Fall 2015.
- **James Madison University**, Harrisonburg, VA. Assistant Professor, Department of Mathematics and Statistics, Fall 2004-Fall 2009.
- **The University of Washington**, Seattle, WA. Department of Applied Mathematics, VIGRE postdoctoral fellow, Fall 2002-Summer 2004.
- **The University of Arizona**, Tucson, AZ. Graduate Student, Program in Applied Mathematics, Fall 1996-Summer 2002.

## Honors and Awards:

- Supporting Science, Mathematics, and Statistics Majors for University Success and Beyond (2022).  
\$1,433,513.00 over 6 years, National Science Foundation (NSF) Award # DUE-2221277  
Co-PI. PI: Lou Ann Lovin. Co-PIs: S. Whitmeyer (Geology), I. Sumner (Chemistry/Biochemistry)

Objective: Scholarship program for students with unmet financial need that includes learning community, support systems, and short-term summer research experiences.

- Transposable elements and genome size divergence between germ line and soma (2014). \$365,517 over 3 years, National Institutes of Health (NIH) Award (VA-13-02-21-226-216-00-660)  
Co-PI. PI: Grace Wyngaard. Co-PI: R. Mueller (Colorado State University)  
Objective: Research grant to use mathematical models of transposable element growth to analyze and interpret differences in DNA sequences of pre- and post-diminished chromatin in a freshwater copepod, *Mesocyclops edax*.
- UBM: Quantitative Skills in Biology through Scientific Inquiry (2007). \$700,000 over 5 years, National Science Foundation (NSF) Award # DMS-0734284  
Principal Investigator. Co-PIs: A. Tongen, N. Jahan, and R. Harris  
Objective: To provide eight undergraduate students (4 biology, 4 math) each year in a year-long research experience in mathematical biology.
- CURM mini-grant: Research Experience in Mathematical Biology (2007)  
\$19,000 over 1 year, The Center for Undergraduate Research in Mathematics (CURM) at Brigham Young University, funded by BYU and NSF Award # DMS-0636648  
Joint-PI with A. Tongen.  
Objective: To train undergraduates in the biological and mathematical sciences in interdisciplinary research through long-term research projects.
- Outstanding Faculty Award (2024)  
College of Science and Mathematics, James Madison University.
- Dave Pruett Faculty Support Endowment for Excellence in Teaching (2016)  
Department of Mathematics and Statistics, James Madison University.
- Department Distinguished Scholar Award (2016)  
Department of Mathematics and Statistics, James Madison University.
- Educational Leave (Spring 2015)  
College of Science and Mathematics, James Madison University.
- Department Distinguished Teaching Award (2014)  
Department of Mathematics and Statistics, James Madison University.
- Graduate Research Fellow (1998)  
National Science Foundation, The University of Arizona, 1998-2001.

**Teaching Experience:** I helped create courses marked with asterisk\*.

- Department of Mathematics, James Madison University
  - **Math 103:** The Nature of Mathematics. Summer 2018

- **Math 231**: Calculus with Functions I. Fall 2004, Summer 2005, Fall 2005, Spring 2009, Fall 2009, Fall 2010, Fall 2011, Fall 2012, Summer 2013, Fall 2013, Spring 2020, Summer 2020, Spring 2021, Fall 2021, Fall 2022
  - **Math 232**: Calculus with Functions II. Spring 2005, Spring 2006, Spring 2010, Spring 2011, Spring 2012, Spring 2013, Spring 2014, Summer 2017, Spring 2023, Fall 2023, Fall 2024
  - **Math 233\***: Calculus with Modeling I. Fall 2015, Spring 2016, Fall 2016, Fall 2017, Fall 2019
  - **Math 234\***: Calculus with Modeling II. Spring 2016, Fall 2017, Spring 2017, Spring 2018, Fall 2019, Spring 2020, Spring 2021
  - **Math 235**: Calculus I. Summer 2006, Fall 2006, Fall 2008
  - **Math 236**: Calculus II. Spring 2007
  - **Math 237**: Calculus III. Summer 2019
  - **Math 238**: Linear Algebra with Differential Equations. Fall 2007, Fall 2014, Summer 2016, Spring 2019, Spring 2024
  - **Math 248**: Computers and Numerical Algorithms. Fall 2005, Fall 2020
  - **Math 318**: Introduction to Probability and Statistics. Spring 2008, Fall 2012, Summer 2014
  - **Math 336**: Elementary Differential Equations. Fall 2017, Fall 2021, Spring 2023
  - **Math 340**: Math Modeling: Optimization. Spring 2007
  - **Math/Physics 341**: Nonlinear Dynamics and Chaos. Spring 2007
  - **Math 342\*** (cross-listed with Biology): Mathematical Models in Biology. Spring 2005 (with Dr. Reid Harris, Biology), Spring 2006 (with Dr. Reid Harris, Biology), Fall 2006, Spring 2009, Spring 2011, Spring 2014 (with Dr. Patrice Ludwig, Biology), Spring 2015, Spring 2018, Spring 2022, Spring 2025
  - **Math 423**: Stochastic Processes. Spring 2013, Spring 2014
  - **Math 440**: Fourier Analysis and Partial Differential Equations. Fall 2018
  - **Math 441**: Analysis and Dynamics of Differential Equations. Spring 2022
  - **CSM 200**: Exploration of Topics in STEM—part of J(ste)MU Scholars. Spring 2024, Spring 2025
- Department of Applied Mathematics, The University of Washington
    - **AMath 352**: Applied Linear Algebra and Numerical Analysis. Spring 2004
    - **AMath 383**: Introduction to Continuous Mathematical Modeling. Autumn 2002, Spring 2003, Autumn 2003
  - Department of Mathematics, The University of Arizona
    - **Math 116**: College Algebra I. Fall 1997

- **Math 117:** College Algebra II. Spring 1998
- **Math 113:** Elements of Calculus. Fall 1999

### Research Mentoring Summary:

- NSF-funded Summer REU projects (2007 and 2008): 2+4 students working on 8-week projects
- CURM-funded mini grant research (2007-08 year): 4 JMU students on academic year project
- NSF-funded UBM project (2007-2012): As PI, I directed the overall grant management including large group workshops in addition to mentoring students. Each research project for this project involved an interdisciplinary team of Math+Biology faculty and Math+Biology students. The grant supported a total of 40 students; I co-mentored with five different biologists and directly supervised 15 students on 6 different projects.
- NIH-funded project (2014–2016): 3 students supported for related summer research.
- Other Independent Study:
  - Honors Thesis advisor: Benjamin Leard (2008), Nina Cross (2009).
  - Honors Thesis project committee: Amy Vess–Crizer, Deena Hannoun, Jillian Myers (biology), Emily Hunt, Connor Kindley
  - Masters thesis committee: Brianna Lam (biology)
- Shenandoah Valley Governor’s School (2017–18): 1 high school senior on senior capstone research project relating to optimization
- Students have made 19 presentations at local, regional and national conferences.

### Refereed Publications:

- P. M. Ludwig, A. Tongen, and Walton, D.B.; “Two Project-Based Strategies in an Interdisciplinary Mathematical Modeling in Biology Course,” *PRIMUS*, **28** (4) 2018. doi:10.1080/10511970.2016.1246495
- C. Sun, G. Wyngaard, D. B. Walton, H. A. Wichman, and R. L. Mueller, “Billions of basepairs of recently expanded, repetitive sequences are eliminated from the somatic genome during copepod development,” *BMC Genomics* **15**: 186, 2014. doi:10.1186/1471-2164-15-186
- B. A. Lam, D. B. Walton, and R. N. Harris, “Motile zoospores of *Batrachochytrium dendrobatidis* move away from antifungal metabolites produced by amphibian skin bacteria,” *EcoHealth* **8** (1): 36-45, 2011.
- D. B. Walton, B. Leard, and A. Tongen, “An optimal strategy for energy allocation in a multiple resource environment,” *Bull. Math. Biol.* **72** (5): 1092-1123, 2010.

- T. Reluga, D. B. Walton, R. Meza, and A. Galvani, “Reservoir interactions and disease emergence,” *Theor. Popul. Biol.*, **72** (3): 400-408, 2007.
- M. Kot, J. Medlock, T. Reluga, and D. B. Walton, “Stochasticity, invasions, and branching random walks,” *Theor. Popul. Biol.* **66** (3): 175-184, Nov 2004.
- Y. Seol, K. Visscher and D. B. Walton, “Suppression of Noise in a Noisy Optical Trap,” *Phys. Rev. Lett.* **93** (16): 160602, Oct 2004.
- D. B. Walton and K. Visscher, “Noise Suppression and Spectral Decomposition for State-Dependent Noise in Presence of Stationary Fluctuating Input,” *Phys. Rev. E* **69**: 051110, 2004.
- D. B. Walton and J. Rafelski, “Equilibrium Distribution of Heavy Quarks in Fokker-Planck Dynamics,” *Phys. Rev. Lett.* **84** (1): 31-34, Jan 2000.

### Other Publications:

- Book review of *Applied Probability* by K. Lange, *SIAM Review* **46** (3): 591-592, 2004.
- “Molecular Motors,” *College of Science Newsletter*, The University of Arizona, Fall 2001.
- “Analysis of localized buckling by multiple scale analysis,” Report in *The Nonlinear Journal* **1**: 18-28, Fall 1999. (<http://math.arizona.edu/~goriely/teach-nlj.html>)

### Web-Based Resources:

- Online calculus text: *A Modeling Approach to Calculus*, 2015-2018.  
<http://educ.jmu.edu/~waltondb/MA2C>
- Collection of web apps for learning and practicing Algebra and Calculus.  
<http://educ.jmu.edu/~waltondb/webapp/>
- Contributor to PreTeXt (<https://pretextbook.org/>), an authoring and publishing system for authors of textbooks, research articles, and monographs, especially in STEM disciplines.

### Professional Presentations:

- “Dynamic, Randomized Exercises Defined in PreTeXt Facilitate Server-Free Interactive Exercises,” MAA Contributed Paper Session on Open-Source Products for the Advancement of Math Education Research and Practice, MathFest, Indianapolis, August 2024.
- “Authoring randomized math exercises for multiple target platforms,” WEBSIGMAA sponsored poster session, MathFest, Indianapolis, August 2024.

- “Maximizing asymptotic growth subject to random season durations,” MAA General Contributed Paper Session, Joint Mathematics Meeting, Baltimore, January 2019.
- “Web-based apps for practicing algebra and calculus skills,” MAA Session on MAA Session on Technology and Apps for Teaching Mathematics and Statistics, Joint Mathematics Meetings, San Diego, January 2018.
- “Web-based apps for practice, scaffolding and conceptualization in calculus,” MAA Session on Mathematical Technology in the Calculus Classroom, Joint Mathematics Meetings, Atlanta, GA, January 2017.
- “A Modeling Approach to Calculus: Using the framework of modeling in the motivation and development of calculus.” MAA Session on Mathematical Modeling in the Undergraduate Classroom, Joint Mathematics Meetings, Seattle, WA, January 2016.
- “Maximum likelihood analysis of transposable element age distributions using a master copy model of evolution.” MAA General Contributed Session, Joint Mathematics Meeting, San Antonio, TX, January 2015.
- “UBM Group Seminar Discussions: Grappling with Issues beyond the Curriculum.” MAA Session on Trends in Undergraduate Mathematical Biology Education, Joint Mathematics Meeting, San Diego, CA, January 2013.
- “Using WeBWorK Online Assignments to Build Student Understanding.” MAA MD-VA-DC Section, Fall meeting, Lexington, VA, October 2012.
- “Quantitative Skills in Biology through Scientific Inquiry at James Madison University.” MAA Poster Session on Projects Supported by the NSF Division of Undergraduate Education, Joint Mathematics Meeting, Boston, MA, January 2012.
- “The Growth of Interdisciplinary Math-Biology Courses at James Madison University.” MAA Session on Undergraduate Mathematical Biology, Joint Mathematics Meeting, San Francisco, CA, January 2010.
- “Quantitative Skills in Biology through Scientific Inquiry at James Madison University.” MAA Poster Session on Projects Supported by the NSF Division of Undergraduate Education, Joint Mathematics Meeting, San Francisco, CA, January 2010.
- “Exploring Male Dimorphism in the Dung Beetle using a Discrete-time Stochastic Population Model.” AMS Contributed Session on Biology, Joint Mathematics Meeting, Washington, DC, January 2009.
- “Ratcheting Up a Fluctuating Environment,” MAA Intermountain Section meeting, Provo, UT, March 2008.
- “Optimal Strategies for Energy Allocation.” Invited keynote address (with A. Tongen) at College of Science and Mathematics Faculty Research and Teaching Symposium, JMU, Harrisonburg, VA, February 2008.

- “Ratcheting Up a Fluctuating Environment,” Poster, College of Science and Mathematics Faculty Research and Teaching Symposium, JMU, Harrisonburg, VA, February 2008.
- “Biological Applications Illustrating Linear Algebra Concepts.” MAA Contributed Paper Session “Innovative and Effective Ways to Teach Linear Algebra,” at Joint Mathematics Meeting, San Diego, CA, January 2008.
- “Ratcheting Up a Fluctuating Environment,” Society for Mathematical Biology annual meeting, San Jose, CA, August 2007.
- “Optimal Allocation Strategies for Multiple Constrained Resources,” Society for Mathematical Biology annual meeting, San Jose, CA August 2007. Co-authors: B. Leard and A. Tongen.
- “Creating a Mathematical Biology Course for Biology Majors.” Minisymposium speaker, Joint SIAM–Life Sciences and SMB Annual Meeting, Raleigh, NC, July 2006.
- “Using Technology to Enhance the Teaching of Quantitative Biology in Mathematics and Biology Courses,” Invited Panel Discussion member, TIMBER 2005, Appalachian State University, Boone, NC, November 2005.
- “Stochastic Models and Filtering of Motor Protein Stepping Data.” Minisymposium speaker, SIAM Annual Meeting, New Orleans, LA, July 2005.
- “Hidden Markov Models and Single-Molecule Motor Protein Experiments,” Contributed session speaker, SIAM–Life Sciences meeting, Portland, OR, July 2004.
- “Hidden Markov model analysis of motor protein data.” Scientific workshop invited participant, Institute for Pure and Applied Mathematics, UCLA, Los Angeles, CA, May 2004.
- “The evolution of the distribution of heavy quarks in a thermal quark-gluon plasma.” Joint work with J. Rafelski (University of Arizona, Physics Department) and T. Sherman (University of Arizona, undergraduate mathematics major). Poster presentation, *Strangeness 2000*, Berkeley, CA, July 2000.

#### **Other Invited Presentations:**

- Department of Biology Seminar, James Madison University, Harrisonburg, VA, 2014.
- Math and Computational Biology Seminar, University of California Berkeley, Berkeley, CA, 2012.
- JMU-SRI Research Exchange, James Madison University, Harrisonburg, VA 2011.
- Department of Physics Seminar, James Madison University, Harrisonburg, VA, 2007.
- Department of Biology Seminar, James Madison University, Harrisonburg, VA, 2005.

- Department of Mathematics Seminar, James Madison University, Harrisonburg, VA 2004.
- Department of Mathematics Seminar, Virginia Commonwealth University, Richmond, VA 2004.
- ACMS Undergraduate Seminar, The University of Washington, Seattle, WA, 2003.
- Mathematical Biology Seminar, Department of Mathematics, University of British Columbia, Vancouver, BC, 2003.
- Applied Mathematics Department Seminar, The University of Washington, Seattle, WA, 2002.
- Mathematical Biology Seminar, Department of Biology, The University of Washington, Seattle, WA, 2002 and 2003.
- Probability Seminar, Department of Mathematics, The University of Washington, Seattle, WA, 2002 and 2004.

#### **Presentations by Mentored Students:**

- Joint Mathematics Meetings (January 2009, January 2013×2, January 2016)
- MAA Mathfest (July 2008)
- Evolution 2010, Portland, OR (June 2010)
- The Institute for Mathematical Biology Education and Resources (TIMBER) conference, Boone, NC (November 2007, November 2008)
- MAA Intermountain Section meeting (Spring 2008)
- MAA MD–DC–VA Section meeting (Spring 2008)
- Shenandoah Undergraduate Mathematics and Statistics (SUMS) research conference, JMU, Harrisonburg, VA (October 2011, September 2012, September 2015)
- Undergraduate Research Conference in Math–Biology at NIMBioS, Knoxville, TN (October 2009, November 2012)
- JMU Biosymposium (April 2010, April 2011)
- Mercer University Undergraduate Research in Mathematics conference (February 2009)

#### **Service:**

- Service to the University and Wider Communities



- Chair-Elect (elected office) and member of executive board, MAA Special Interest Group in Mathematics Instruction Using the Web (WEBSIGMAA), January 2025–present.
- Program Chair (elected office) and member of executive board, MAA Special Interest Group in Mathematics Instruction Using the Web (WEBSIGMAA), January 2024-February 2025.
- College Search committee: 2021–22 and 2022–23 (environmental data science cohort hire).
- Search committee for AUH of Mathematics and Statistics: 2021–22.
- Program Chair (elected office) and member of executive board, MAA Special Interest Group in Mathematical and Computational Biology (BIO SIGMAA), January 2015-January 2017.
- Invited Paper Session co-organizer, “MAA Invited Paper Session on Current Trends in Mathematical and Computational Biology” at Joint Mathematics Meetings, January 2017.
- Invited Paper Session organizer, “MAA Invited Paper Session on Current Trends in Mathematical and Computational Biology” at Joint Mathematics Meetings, January 2016.
- SRI-JMU Collaboration Committee, 2010-2012.
- College of Science and Mathematics College Council, at-large member, Fall 2011-Spring 2014.
- Secretary (elected office) and member of executive board, MAA Special Interest Group in Mathematical and Computational Biology (BIO SIGMAA), January 2009-January 2011.
- SRI-JMU Collaboration Committee, 2010-2012.
- Faculty Advisor to Latter-day Saint Student Association (LDSSA), student organization, JMU, January 2005–December 2011.
- University-wide Neuroscience Program Development committee, JMU, Spring 2008.
- NSF grant proposal review panel, June 2006.
- Academic Peer Review for Journals:
  - \* *Discrete and Continuous Dynamical Systems*, 2005.
  - \* *Bulletin for Mathematical Biology*, 2005.
- Poster judge at JMM undergraduate poster session, San Diego, CA, January 2013.
- Poster judge at SMB annual meeting, San Jose, CA, August 2007.
- Service to the Department of Mathematics and Statistics, James Madison University
  - Associate Academic Unit Head, Fall 2019–present

- Department Advisory Committee member, Fall 2010–Spring 2013, Fall 2018–19.
- Personnel Advisory Committee, 2013–14, 2016–17, 2017–18, 2018–19 (chair), 2019–20 (chair).
- Applied Mathematics area chair, Fall 2010–Spring 2013.
- Department Search committee: Spring 2005, 2008–09 (chair), 2011–12 (chair), 2020–21 (chair), 2023-24 (chair), 2024-25 (chair).
- Applied Mathematics area committee, Fall 2004–present.
- Statistics area committee, Spring 2005–Spring 2019.
- Calculus committee, 2008–2011, 2017–19.
- Assessment committee, 2013–14, 2016–17, 2024–present.
- WeBWorK support and administration
  - \* Author problems, 2009-present
  - \* Organize Math 205 problem set, 2010
  - \* Liasson with CIT/LET and department admin for JMU server, 2010-present
- Ad hoc Math 105 curriculum development committee, 2011-2013.
- Ad hoc Major Vision committee, Fall 2006–Spring 2007.
- Faculty advisor for assigned mathematics majors, 2008–present.
- Faculty Advisor/Coach for COMAP MCM/ICM modeling competition.
  - \* MCM, February, 2008. Team earned Meritorious.
  - \* MCM, February, 2007. Team earned Meritorious.
  - \* ICM, February, 2006. Team earned Honorable Mention.
  - \* ICM, February, 2005. Team earned Honorable Mention.

**Professional Societies:**

- Mathematical Association of America (BIO SIGMAA, WEB SIGMAA, and member)
- Society for Industrial and Applied Mathematics (Life Sciences Activity Group member)