BRUCE KESSLER
Curriculum Vita – September 2021

Virtual Instructor, Mathematics
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EDUCATION

Grad. Cert.	December 2021	Western Kentucky University	Data Analytics
Ph.D.	August 1997	Vanderbilt University	Mathematics
M.S.	May 1991	Vanderbilt University	Mathematics
A.B.	May 1989	Western Kentucky University	Mathematics

EMPLOYMENT HISTORY

Virtual Instructor, Mathematics	South Carolina Governor's School of Science and Mathematics	8/5 -
Department Head, Mathematics	Western Kentucky University	1/13 - 6/21
Interim Department Head, Mathematics	Western Kentucky University	7/12 - 12/12
Associate Dean, Ogden College	Western Kentucky University	7/10 - 12/12
Professor, Mathematics	Western Kentucky University	7/07 - 6/21
Assistant Dean, Ogden College	Western Kentucky University	7/06 - 6/10
Interim Assistant Dean, Ogden College	Western Kentucky University	7/04 - 6/06
Associate Professor, Mathematics	Western Kentucky University	7/02 - 6/07
Assistant Professor, Mathematics	Western Kentucky University	7/97 - 6/02
Instructor, Mathematics	Western Kentucky University	7/91 - 6/97
Graduate Teaching Assistant, Mathematics	Vanderbilt University	8/94 - 5/95 8/89 - 5/91

CURRENT FIELDS OF INTEREST

Data Analytics, Mathematical Modeling, Curriculum Development, Wavelets, Signal Processing

PEER-REVIEWED PUBLICATIONS

"Math Comic Books to the Rescue: Can Wonderguy's Escapades Improve Children's Mathematics Attitudes?," *Technology, Instruction, Cognition, and Learning* **11**, 259–286 (2019) (3rd author, with Janet Tassell (1st) and Elena Novak (2nd)).

"Using survival analysis to discovering pathways to success in mathematics," *Computers in Human Behavior* **92**, 487–495 (March 2019) (4th author, with Leyla Zhuhadar (1st), Jerry Daday (2nd), Scarlett Marklin (3rd), and Tuesdi Helbig (5th)).

"Density-dependent Leslie matrix modeling for logistic populations with steady-state distribution control," *The Mathematical Scientist* **41:2**, 119–128 (December 2016) (with Andrew Davis).

"Analysis of 14-MeV neutron induced gamma ray spectra using multiwavelets," *Radiation Measurements* **79**, 43–49 (August 2015) (2nd author, with Alexander Barzilov (1st) and Phillip C. Womble (3rd)).

"Operation Comics: Math in a Comic Book Format," *The Eighth Conference of MCG International Group for Mathematical Creativity and Giftedness Proceedings*, 65–70 (2014) (with Janet Tassell).

"*Chlamydomonas reinhardtii* strain CC-124 is highly sensitive to blue light in addition to green and red light in resetting its circadian clock, with the blue-light photoreceptor plant cryptochrome likely acting as negative modulator," *Plant Physiology and Biochemistry* **75**, 14–23 (2014) (6th author, with Jennifer Forbes-Stovall (1st), Jonathan Howton (2nd), Matthew Young (3rd), Gavin Davis (4th), Todd Chandler (5th), Claire A. Rinehart (7th), and Sigrid Jacobshagen (8th)).

"Wavelet-Based Analysis of Neutron-Induced Photon Spectral Data," *Tenth International Topical Meeting on Nuclear Applications of Accelerators*, 458–464 (2012) (2nd author, with Alexander Barzilov (1st) and Phillip Womble (3rd)).

"Operation Comics: The Story Continues," *Proceedings of Bridges 2011: Mathematics, Music, Art, Architecture, Culture*, edited by Reza Sarhangi and Carlos Sequin, 225–232 (2011) (with Janet Tassell and Tressa Tullis).

"Improved automated monitoring and new analysis algorithm of circadean phototaxis rhythms in Chlamydomonas," *Plant Physiology and Biochemistry* **48**, 239–246 (2010) (3rd author, with Christa Gaskill (1st), Jennifer Forbes-Stovall (2nd), Mike Young (4th), Claire Rinehart (5th), Sigrid Jacobshagen (6th)).

"Comic Books That Teach Mathematics," *Proceedings of Bridges 2009: Mathematics, Music, Art, Architecture, Culture*, edited by Craig S. Kaplan and Reza Sarhangi, 97–104 (2009).

"Using Works of Visual Art to Teach Matrix Transformations," *Proceedings of Bridges 2009: Mathematics, Music, Art, Architecture, Culture*, edited by Craig S. Kaplan and Reza Sarhangi, 215–222 (2009) (with James Luke Akridge, Rachel Bowman, and Peter Hamburger).

"Multiwavelets for Quantitative Pattern Matching," *Proceedings of the 42nd Annual Hawaii International Conference on System Sciences* (CD-ROM), January 5–8, 2009, Computer Society Press, 10 pages (2009).

"At least four distinct circadean regulatory mechanisms required for all phases of rhythms in mRNA amount," *Journal of Biological Rhythms*, Vol. 23, No. 6, 511–524 (2008) (2nd author, with Sigrid Jacobshagen (1st) and Claire Rinehart (3rd)).

"A "Sound" Approach to Fourier Transforms: Using Music to Teach Trigonometry," *2007 Bridges Donostia Conference Proceedings*, edited by Reza Sarhangi and Javier Barrallo, Tarquin Publications, 135–142 (2007).

"Balanced biorthogonal scaling vectors using fractal function macroelements on $[0, 1]$," *Applied and Computational Harmonic Analysis* **22**, 286–303 (2007).

"An orthogonal scaling vector generating a space of C^1 cubic splines using macroelements," *Journal of Concrete and Applicable Mathematics: Special Issues on Wavelets and Applications* **4(4)**, 393–414 (2006).

"Balanced scaling vectors using linear combinations of existing scaling vectors," *Approximation Theory XI: Gatlinburg 2004*, edited by Charles K. Chui, Mike Neamtu, and Larry L. Schumaker, Nashboro Press, Brentwood, TN, 197–208 (2005).

"Orthogonal macroelement scaling vectors and wavelets in 1-D," *The Arabian Journal for Science and Engineering: Special Issue on Fractals and Wavelets*, 28:1C, 73–88 (2003) (with Douglas P. Hardin).

"Constructions of orthogonal and biorthogonal scaling functions and multiwavelets using fractal interpolation surfaces," chapter in *Advances in Imaging and Electron Physics* **124**, edited by Peter Hawkes, Academic Press, 195–251 (2002).

"A short-support dual mask to the piecewise linears on a uniform triangulation," *Approximation Theory X: Wavelets, Splines, and Applications*, edited by Charles K. Chui, Larry L. Schumaker, and Joachim Stöckler, Vanderbilt University Press, 323–332 (2002).

"A construction of compactly-supported biorthogonal scaling vectors and multiwavelets on $\mathbf{R}^2$," *Journal of Approximation Theory* **117:2**, 229–254 (August 2002).

"A construction of orthogonal compactly-supported multiwavelets on $\mathbf{R}^2$," *Applied and Computational Harmonic Analysis* **9**, 146–165 (2000).

"A construction of two-dimensional multiwavelets on a triangulation," *Wavelet Applications in Signal and Image Processing IV*, edited by M. Unser, A. Aldroubi, and A. Laine, 98–108 (1996) (with George Donovan, Jeff Geronimo, and Doug Hardin).

"A multiresolution analysis based on fractal functions," *Journal of Approximation Theory* **71:1**, 104–120 (1992) (with Doug Hardin and Peter Massopust).

GRANTS AND CONTRACTS

"Logistic Modeling of the Leslie Matrix for Mapping Population Growth," WKU Faculty Undergraduate Student Engagement grant, $4,500 (faculty mentor to student Andrew Davis)

"Examining the Impact of Course Sequencing as Pathways to Success in STEM", WKU Research & Creative Activities Program, 2014-2015, $15,148, (Co-PI, with Leyla Zhuhadar (Principal), Jerry Daday, Tuesdi Helbig, and Olfa Nasraoui (University of Louisville))

"Wavelet-Based Elemental Spectrum Analysis Algorithm," Kentucky Science and Technology Corporation, Kentucky Commercialization Fund, 2010-2011, $36,885

"Math Content in Comic Book Format," WKU Provost's Initiatives for Excellence Grant, 2008-2009, $4,000

"The Development of a Prototype for the Algorithmic Classification of Active/Inactive Unexploded Ordnance," Kentucky Science and Technology Corporation, Kentucky Science and Engineering Foundation R & D Excellence Grant, 2008-2010, $94,595 (with Phillip Womble)

"CyberDefense," Army Research Lab/EWA (Electronic Warfare Associates), 2007-2009, $274,870 (Co-PI, with Phillip Womble (Principal) and Uta Ziegler)

"WKU Undergraduate Research Conference," WKU Provost's Initiatives for Excellence Grant, 2007, $5,470 (with Larry Snyder)

"WKU Undergraduate Research Celebration," WKU Provost's Initiatives for Excellence Grant, 2006, $7,890 (with Larry Snyder)

"Mathematics Television Program on WKU Internal Cable," WKU Provost's Initiatives for Excellence Grant, 2005, $6,400

"Applications of Fractal Functions for Image Processing," National Science Foundation, EPSCoR Research Enhancement Grant, 2004, $16,204

"Applications of Fractal Functions for Image Processing," Kentucky Science and Technology Corporation, Kentucky Science and Engineering Foundation R & D Excellence Grant, 2003-2005, $48,267

"Math Outreach Project," WKU Action Agenda, 2002-2003, $4,800

"The Development of Dilation-2 Scaling Functions on a Uniform Triangulation," WKU Summer Research Fellowship, 2002, $5,000

"Proposal for the purchase of software via CPE Action Agenda funds," WKU Action Agenda grant, 2001-2002, $2,685

"Statistics and Applied Mathematics in Business and Industry Initiative," WKU Applied Technology and Research Center grant, 1999-2000, $7,987

"An Application of 2-D Wavelets on Arbitrary Triangulations for Image Compression," WKU Summer Research Fellowship, 1998, $5,000

PATENTS

"METHOD AND APPARATUS FOR WAVELET BASED ELEMENTAL SPECTRUM ANALYSIS," U. S. Patent Office #8,412,468, April 2, 2013

CURRICULA AND MEDIA CONTRIBUTIONS

"Comic Books to Teach Mathematics? Bruce Kessler Says Yes," *The Challenge*, WKU Center for Gifted Studies, Summer 2011, pp. 18–19 (interviewed by Tracy Inman), **www.wku.edu/gifted/documents/challenge27.pdf**.

"Operation Comics," *WKU Spirit*, WKU Alumni Association, Summer 2011, pp. 36–47 (illustrations by Tressa Tullis, photographs by Clinton Lewis), **http://www.epagepub.com/publication/?i=71366**.

"Professor helps in search for explosives, illegal substances," *Bowling Green Daily News*, July 20, 2011, available at **http://www.bgdailynews.com/news/professor-helps-in-search-for-explosives-illegal-substances/article_4e522303-8ee9-54df-9571-c16d4f944996.html**

"Software product may improve security screening, explosives detection," WKU News (and other media, as the story was picked up by the Associated Press), March 18, 2011, available at **http://wkunews.wordpress.com/2011/07/18/peaklet-analysis/#more-10929**.

"*Peaklet Analysis* User's Guide," 22-page document that accompanied the *Peaklet Analysis* software download, a joint venture with HitCents, Inc.

"Comic Book Guy," *Bowling Green Daily News*, March 28, 2011, available at **http://www.bgdailynews.com/news/comic-book-guy/article_8ea0281c-c99c-50cb-b5e3-8ad4d481df72.html**.

"WKU Professor Develops Comic Book Series to Teach Math," interview by Dan Modlin for WKYU, March 11, 2011, available at **http://www.publicbroadcasting.net/wkyu/news.newsmain/article/0/0/1774158/news/WKU..Professor.Develops.Comic.Book.Series.to.Teach.Math**.

Episode of WKU's *View from the Hill* by Amy Bingham on the *Operation Comics* series, February 9, 2010, available at **www.youtube.com/watch?v=AQMl7gm6vJQ**.

Math Placement Exam and *Trigonometry Placement Exam*, Spring 2010, moved the Math Department's old math placement exam and the Trigonometry Placement Exam created in Summer 2008 to an in-house parametrized test that could be accessed through TopNet, with the help of Pat Johnson (IT), Ted Eysenbach (IT), and Jane Brantley, for use starting with the pre-Fall 2010 Academic Transitions Programs. My primary role was to design the parametrized questions, with one right and four wrong solutions, based on the old math placement exam, test the parameters to make sure that we did not accidentally generate identical solutions, and to generate the images of the questions and solutions for inclusion in the testing software, eliminating the need for special plug-ins for the test-taker's web browser. In Summer 2020, I helped move both exams into Blackboard so that they could be administered remotely under a lockdown browser.

Operation Comics, Spring 2009, Summer 2010 through Spring 2013, 1 double-issue and 6 regular issues; comic books with embedded mathematical content appropriate for fourth- through sixth-grade students, in cooperation with Janet Tassell and mathematics faculty at Cumberland Trace Elementary, available as e-books at **works.bepress.com/bruce_kessler** in the "Books" section and as hard copies at **operationcomics.com**.

Trigonometry Placement Exam, Summer 2008, created by Jane Brantley and myself, for use starting with the pre-Spring 2009 Academic Transition Programs via the webpage **www.mathclass.org** until Spring 2010.

My Trig Book, Fall 2007, a trigonometry textbook developed for students in the Gatton Academy of Mathematics and Science in Kentucky who require trigonometry before taking calculus, 183 pages, available at **works.bepress.com/bruce_kessler** in the "Books" section (updated in Fall 2011).

"Math Matters: Why Do I Need To Know This?" Spring 2006, 14 half-hour television programs produced by WKYU of applications of mathematics found in WKU's College Algebra and General Math courses, which aired on WKU's internal cable system, available at **www.wku.edu/mathmatters**.

INVITED LECTURES

"Number NonSense: To Infinity and Beyond," Bowling Green's Science Café, Preservation Tasting Room and Bottle Shop, Bowling Green, KY, 2020

"Operation Comics: Making Math Fun," for the students of T. C. Cherry Elementary School, keynote speaker of their Young Writer's Showcase, Bowling Green, KY, 2016

"Operation Comics: Making Math Fun," for the eighth graders of Bluegrass Middle School, Elizabethtown, KY, 2015

"Star Wars: Communication Across a Galaxy," Nut Gathering Science Cafe for SkySciFest, White Squirrel Brewery, Bowling Green, KY, 2015

"The Role that Faculty Can Play in Retaining Students," Student Success Summit, Bowling Green, KY 2015

"Operation Comics: Making Math Fun," for the fourth and fifth graders of T. C. Cherry Elementary School, Bowling Green, KY, 2014

"The Mathematics (and Physics) of Projectile Motion," for the Math Club of Hart County High School, Bowling Green, KY, 2014

"Operation Comics: Making Math Fun," for the fourth, fifth, and sixth graders of Legrande Elementary School, Legrande, KY, 2014

"The Mathematics (and Physics) of Projectile Motion," Somerset Community College, Somerset, KY, 2014

"Operation Comics: Making Math Fun," for gifted and talented fifth and sixth graders visiting Somerset Community College, Somerset, KY, 2014

"Peaklet Anaylsis: Software for Spectrum Analysis," Kentucky Innovation and Entrepreneurship Conference, Lexington, KY, 2013

"Operation Comics: Making Math Fun," Western Kentucky University - Glasgow Campus, Glasgow, KY, 2013

"It's Okay to Be Good at Math," Greenwood High School Leadership Day, keynote speaker, Bowling Green, KY, 2012

"Teaching with Comic Books: Operation Comics," professional development opportunity for Warren County Board of Education, Bowling Green, KY, 2011 (with Janet Tassell, Tressa Tullis, Mary Evans, Cathy Willoughby, Melissa Zimmer, and Emily Duryea)

"Operation Comics: Making Math Fun," keystone speaker at the STEM Innovation Celebration 2011, sponsored by the Owensboro Community and Technical College, Owensboro, KY, 2011

"*Peaklet Analysis*: Wavelet-Based Software for the Analysis of Spectrum Data," Lunch-time seminar for Rapiscan Laboratories, Sunnyvale, CA, 2011

"Seeing Sounds with Mathematics," for the Women and Kids Learning Together Camp, Bowling Green, KY, 2011

""Drawing" Upon Your Students' Creativity: Teaching (Your Subject Here) with Comic Books," The WKU Writing Project Spring Day of Workshops, Bowling Green, KY, 2011

"A Primer on Chaos and Fractals," seminar preceding the performance of Tom Stoppard's play *Arcadia* at Lipscomb University, Nashville, TN, 2011

"An Algorithm for Wavelet-Based Elemental Spectrum Analysis," Workshop for Northrup-Grumman, Huntsville, AL, 2010

"An Algorithm for Wavelet-Based Elemental Spectrum Analysis," Lunch-time seminar for Rapiscan Laboratories, Sunnyvale, CA, 2010

One day of the SEE-MATH workshop, giving hands-on activities and content in mathematics for Nashville-area high school math teachers, separated into four sessions, "Toll Booth Math," "The Birthday Bet," "Lottery Math," and "Newton's Method for Finding Beautiful Mathematics," Lipscomb University, Nashville, TN, 2008 and 2009

One day of the SEE-MATH workshop, giving hands-on activities and content in mathematics for Nashville-area high school math teachers, separated into two sessions, ""Why do I need to know this?" A Hands-On Application of Algebra and Trigonometry," and "Newton's Method for Finding Beautiful Mathematics," Lipscomb University, Nashville, TN, 2007

"Departmental Innovations for Closing the Preparation Gap," FaCET '06 Summer Conference: Inspiring the Underprepared Student, Western Kentucky University, Bowling Green, KY, 2006 (with L. Pulsinelli)

"Fourier Analysis vs. Wavelet Analysis: May the Best Basis Win," Math Club Colloquium, Vanderbilt University, Nashville, TN, 2006

"Image Compression, JPEG, and Wavelets," Tennessee MAA Annual Meeting, Lipscomb University, Nashville, TN, 2005

"Image Compression, JPEG, and Wavelets," Natural Sciences Seminar Series, Jefferson Community College, Louisville, KY, 2005

"Image Compression, JPEG, and Wavelets," Math Department Colloquium, Campbellsville University, Campbellsville, KY, 2005

"Orthogonal Scaling Vectors, Fractal Functions, and Image Compression," Math Department Colloquium, Georgia Institute of Technology, Atlanta, GA, 2004

"A Mathematical Glimpse of the Universe," Math Department Colloquium, Morehead State University, Morehead, KY, 2003

Teacher's workshop on hands-on uses for algebra and trigonometry, and student convocation "A Mathematical Glimpse of the Universe," Cumberland College, Williamsburg, KY, 2003

"A Construction of Dilation-2 Scaling Vectors Using Fractal Surfaces," Math Department Colloquium, Murray State University, Murray, KY, 2002

"Compression, JPEG, and Wavelets," WKU chapter of the Association for Computer Machinery, Bowling Green, KY, 2001

CONTRIBUTED TALKS

"Detecting Gerrymandering with Computational Algorithms," 40th Annual WKU Math Symposium, Bowling Green, KY, 2021 (supervised the work of student presenter Shreeya Arora)

"Applying a density-dependent Leslie matrix model with steady-state distribution control to logistic populations," Kentucky Mathematical Association of America Annual Meeting, Berea, KY, 2017 (supervised the work of student presenter Andrew Davis)

"Density-Dependent Leslie Matrix Modeling for Logistic Populations with Steady-State Distribution Control," 36th Annual WKU Math Symposium, Bowling Green, KY, 2016 (supervised the work of student presenter Andrew Davis)

"Observations on the Logistic Population Model with a Non-Constant Carrying Capacity," 36th Annual WKU Math Symposium, Bowling Green, KY 2016

"Density-Dependent Leslie Matrix Modeling for Logistic Populations with Steady-State Distribution Control," Kentucky Academy of Sciences Annual Meeting, Louisville, KY, 2016 (supervised the work of student presenter Andrew Davis)

"Density-Dependent Leslie Matrix Modeling for Logistic Populations with Steady-State Distribution Control," 9th International Symposium on Biomathematics and Ecology Education and Research, Charleston, SC, 2016 (supervised the work of student presenter Andrew Davis)

"Matrices for Discrete Logistic Population Modeling with Distribution Control," Kentucky Mathematical Association of America Annual Meeting, Highland Heights, KY, 2016 (supervised the work of student presenter Andrew Davis)

"A Logistic Version of the Leslie Matrix for Population Modeling," Kentucky Academy of Sciences Annual Meeting, Bowling Green, KY, 2015 (supervised the work of student presenter Andrew Davis)

"A Logistic Version of the Leslie Matrix for Population Modeling," 35th Annual WKU Math Symposium, Bowling Green, KY, 2015 (supervised the work of student presenter Andrew Davis)

"A Logistic Version of Leslie Matrices for Population Modeling," Kentucky Mathematical Association of America Annual Meeting, Morehead, KY, 2015 (supervised the work of student presenter Andrew Davis)

"Operation Comics: Math in a Comic Book Format," 8th International Conference on Mathematical Creativity and Giftedness, Denver, CO, 2014 (with co-presenter Janet Tassell)

"Leslie Matrices for Logistic Population Modeling," 33rd Annual Mathematics Symposium, Bowling Green, KY, 2013

"Modeling a Falling Slinky^{TM}," Kentucky Academy of Science Annual Meeting, Morehead, KY, 2013 (supervised the work of student presenter Stephanie Hagan)

"Circulant Matrices and Cryptography," Kentucky Mathematical Association of America Annual Meeting, Lexington, KY, 2013 (with student co-presenter Wiliam Garcia)

"Operation Comics: The Story Continues," Bridges Conference: Mathematics, Music, Art, Architecture, Culture, Coimbra, Portugal, 2011 (with student co-presenter Tressa Tullis and co-author Janet Tassell)

"Wavelet-Based Analysis of Neutron-Induced Photon Spectral Data," Tenth International Topical Meeting on Nuclear Applications of Accelerators, Knoxville, TN, 2011 (with Alexander Barzilov and Phillip Womble)

"A "Peak" at the Algorithm Behind "Peaklet Analysis" Software," Kentucky Mathematical Association of America Annual Meeting, Richmond, KY, 2011

"The Use of DT Fusion Neutrons in Prompt Gamma Analysis of Large Samples," International Conference on Modern Trends in Activation Analysis - 13, College Station, TX, 2011 (with presenter Alexander Barzilov, Ivan Novikov, and Phillip Womble)

"Revolutionary Programs with Strategies to Prepare Highly Effective Teachers in Math and Science," AACTE 63rd Annual Meeting & Exhibits, San Diego, CA, 2011 (discussant along with Sam Evans, presented by Roger Pankratz, Susan Brenner, and Mary Harris)

"Applications of Linear Algebra in Elucidating the Role of Microbial Loops Through Food Web Network Analysis," Kentucky Academy of Sciences Annual Meeting, Bowling Green, KY, 2010 (with student presenter Justine Missik, Albert Meier, Katie Ayers, and Stuart Borrett)

"Influences of Microbial Networks on Food Webs," Ecological Society of America Annual Meeting, Pittsburg, PA, 2010 (with Albert Meier, student presenter Justine Missik, Katie Ayers, Jonathan Bowers, Meridith Bartley, and Stuart Borrett)

"An Algorithm for Wavelet-Based Elemental Spectrum Analysis," Thirteenth International Conference on Approximation Theory, San Antonio, TX, 2010

"Sierpinski Portraits," Kentucky Academy of Sciences, Highland Heights, KY, 2009

"Comic Books That Teach Mathematics," Bridges Banff Conference, Banff, Alberta, Canada, 2009

"Using Works of Visual Art to Teach Matrix Transformations," Bridges Banff Conference, Banff, Alberta, Canada, 2009 (with student presenters James Luke Akridge and Rachel Bowman, and Peter Hamburger)

"Elementary-Level Mathematics Content in Comic Book Format," CPE Conference on the Scholarship of Teaching and Learning," Lexington, KY, 2009 (with other presenters Janet Tassell, Mary Evans, Cathy Willoughby, and Melissa Zimmer)

"Multiwavelets for Quantitative Pattern Matching," 42nd Annual Hawaii International Conference on System Sciences, Waikoloa, Hawaii, 2009

"Mathematical Myth-busting: The "Boiling Water" Myth," Kentucky Mathematical Association of America Annual Meeting, Bowling Green, KY, 2008

"An Education Partnership with Science and Engineering, Arts and Humanities, and Two School Districts That Prepare Teachers to Impact P-12 Learning," AACTE 60th Annual Meeting & Exhibits, New Orleans, LA, 2008 (with other presenters Roger Pankratz, Sam Evans, Kerrie McDaniel, David Lee, Tim Murley, and Lisa Stooksbury)

"A new algorithm for analysis of circadian rhythms data generated by a new phototaxis machine," Kentucky Academy of Sciences, Louisville, KY, 2007 (presented by student Christa Gaskill, and also with Claire Rinehart and Sigrid Jacobshagen)

"The Dependence of Successful Pattern-Matching with Multiwavelets on the Approximation Order of the Basis," Kentucky Academy of Sciences, Louisville, KY, 2007

"The Journey Toward an Effective Partnership Between the Colleges of Education, Science and Engineering, Arts and Letters, and Two Local School Systems to Prepare High-Quality Teachers," The Learning Network Annual Conference, Teachers for a New Era, Denver, CO 2007 (with other presenters Roger Pankratz and Sam Evans)

"Don't Believe Everything That You See," WKU Mathematics Symposium, Bowling Green, KY, 2007

"A "Sound" Approach to Fourier Transforms: Using Music to Teach Trigonometry," Bridges Donostia Conference, San Sebastian, Spain, 2007

"Multiwavelet Decompositions for Denoising and Pattern Matching in an Element-Recognition Application," Twelfth International Conference on Approximation Theory, San Antonio, TX, 2007

"Partnering With a Standards Board to Supercharge Teacher Induction and Introduce an Innovative Master's Program: The Challenges of Redesigning Science and Mathematics Content Courses to Address State K-12 Content Standards," AACTE 59th Annual Meeting & Exhibits, New York, NY, 2007 (with other presenters Kerrie McDaniel, Wanda Weidemann, Sam Evans, and Roger Pankratz)

"A (Successful) Example of How Data on Student Learning Can Impact Program Change in Content Areas," AACTE 59th Annual Meeting & Exhibits, New York, NY, 2007 (with other presenters Kerrie McDaniel, Wanda Weidemann, Sam Evans, and Roger Pankratz)

"A "Sound" Approach to Fourier Transforms," WKU Mathematics Symposium, Bowling Green, KY, 2006

"Automated Pattern Recognition Using Wavelet Decompositions," Kentucky Academy of Sciences, Morehead, KY, 2006

"Why do I need to know this? Everyday Math on Campus TV," WKU Engaging the Spirit Conference, Bowling Green, KY, 2006

"Why do I need to know this? Everyday Math on Campus TV," Kentucky Council on Postsecondary Education conference on the Scholarship of Teaching & Learning: Engaging Students for Success, Lexington, KY, 2006

"Fourier Analysis vs. Wavelet Analysis: May the Best Basis Win," WKU Mathematics Symposium, Bowling Green, KY, 2005

"Versatile Mathematics in Modeling Biological Systems," Kentucky Academy of Sciences, Richmond, KY, 2005

"Nonseparable Orthogonal Extensions of Spline Scaling Vectors," International Conference on the Interactions Between Wavelets and Splines, Athens, GA, 2005

"Wavelet-Based Cryptography in Images," Kentucky Mathematical Association of America Annual Meeting, Morehead, KY, 2005

"Fractal Surface Macroelements for Orthogonal Nonseparable Bases," American Mathematical Society Spring Southeast Sectional Meeting, Bowling Green, KY, 2005

"Summer Gifted Programs," Kentucky Association of Gifted Educators Annual Conference, Lexington, KY, 2005 (with other presenters Julia Roberts and Tracy Inman)

"Balanced Scaling Vectors Using Fractal Functions," American Mathematical Society Fall Southeast Sectional Meeting, Nashville, TN, 2004

"Nonseparable Dilation-2 Scaling Vectors on $\mathbb{R}^2$ with Approximation Order 2 Using Fractal Functions," Second International Conference on Computational Harmonic Analysis in conjunction with the 19th Annual Shanks Lecture, Nashville, TN, 2004

"Order-Preserving, Near-Orthogonal Prefiltering for a Class of Scaling Vectors," Eleventh International Conference on Approximation Theory, Gatlinburg, TN, 2004

"Differentiable Scaling Vectors and Image Compression," Society of Industrial and Applied Mathematicians Southeast Atlantic Section Meeting, Johnson City, TN, 2004

"Construction and Application of a New Scaling Vector and Multiwavelets Using Macroelements," International Conference on Advances in Constructive Approximation, Nashville, TN, 2003

"New Scaling Functions and Wavelets," Kentucky Mathematical Association of America Annual Meeting, Louisville, KY, 2003

"Denoising of Images with Wavelets," Kentucky Mathematical Association of America Annual Meeting, Georgetown, KY, 2002

"Optimal Prefilters for a DGHM 2-D Orthogonal Scaling Vector," Tenth Southeastern Approximation Theory Conference, Athens, GA, 2002

"The Effects of Prefiltering on Wavelet-Based Data Compression Schemes," WKU Math Department Colloquium, Bowling Green, KY, 2001

"A Construction of a Dual Biorthogonal Basis for Piecewise Linears on a Uniform Triangulation," Tenth International Conference on Approximation Theory, St. Louis, MS, 2001

"Tensor Product Bases," Kentucky Academy of Sciences, Lexington, KY, 2000

"Mathematical Eyeglasses: Crime-Fighting, Spy Satellites, and Wavelets," WKU Mathematics Symposium, Bowling Green, KY, 2000

"Edge-Detection Using Wavelet Tensor Products," 28th Annual Miami University Conference, Oxford, OH, 2000

"A Construction of Compactly-Supported Biorthogonal Scaling Vectors and Multiwavelets on $\mathbb{R}^2$," Trends in Approximation Theory, An International Symposium Celebrating the 60th Birthday of Larry L. Schumaker, in conjunction with the 15th Annual Shanks Lecture, Nashville, TN, 2000

"'Dual'-ing Orthogonalities," Kentucky Mathematical Association of America Annual Meeting, Richmond, KY, 2000

"'Dual'-ing Orthogonalities," WKU Mathematics Symposium, Bowling Green, KY, 1999

"'Dual'-ing Orthogonalities," Kentucky Academy of Sciences, Richmond, KY, 1999

"Edge Detection Basics," WKU Math Department Colloquium, Bowling Green, KY, 1999

"Common Approximation Techniques and Image Compression," Kentucky Mathematical Association of America Annual Meeting, Louisville, KY, 1999

"A Construction of Orthogonal Compactly-Supported Multiwavelets on $\mathbb{R}^2$," Ninth International Conference on Approximation Theory, Nashville, TN, 1998

"Common Approximation Techniques and Image Compression," Kentucky Academy of Sciences, Morehead, KY, 1997

POSTERS

"Applying a density-dependent Leslie matrix model with steady-state distribution control to logistic populations," presented by student co-author Andrew Davis, WKU Student Research Conference, Bowling Green, KY 2017

"Applying a density-dependent Leslie matrix model with steady-state distribution control to logistic populations," presented by student co-author Andrew Davis, Posters at the Capitol, Frankfort, KY 2017

"Matrices for Discrete Logistic Population Modeling with Distribution Control," presented by student co-author Andrew Davis, WKU Student Research Conference, Bowling Green, KY, 2016

"A Logistic Version of Leslie Matrices for Population Modeling," presented by student co-author Andrew Davis, WKU Student Research Conference, Bowling Green, KY, 2015

"*Peaklet Analysis*: A Summary of Commercialization Efforts and Analysis Capabilities," Kentucky Innovation and Entrepreneurship Conference, Louisville, KY, 2012

"*Peaklet Analysis*: Software for Fast, Accurate, and Automated Analysis of Spectrum Data," Kentucky Innovation and Entrepreneurship Conference, Louisville, KY, 2011

"Influences of microbial loops on connectivity of food web networks," presented by student co-author Justine Missik, 96^{th} Ecological Society of America Annual Meeting, Austin, TX, 2011 (third author, with Albert Meier, Stuart Borrett, Meridith Bartley)

"Experimental Testing of the Wavelet-Based Classification Algorithm of Active/Inactive Unexploded Ordnance," Kentucky Innovation and Entrepreneurship Conference, Lexington, KY, 2010 (with Phillip Womble and Alexander Barzilov)

"Addition of microbial loops to to food webs: Increases in connectivity, pathway proliferation, and dominant eigenvalues," presented by student co-author Justine Missik, 95^{th} Ecological Society of America Annual Meeting, Pittsburgh, PA, 2010 (fifth author, with Albert Meier, Stuart Borrett, Kati Ayers)

"Algorithmic Classification of Active/Inactive Status of Unexploded Ordnance," International Topical Meeting on Nuclear Research Applications and Utilization of Accelerators, Venice, Austria, 2009 (with Phillip Womble and Joseph Howard)

"Algorithmic Classification of Active/Inactive Status of Unexploded Ordnance," Kentucky Innovation and Entrepreneurship Conference, Louisville, KY, 2009 (with Phillip Womble and Joseph Howard)

"Automated Monitoring and Data Analysis of Circadean Phototaxis Rhythms," presented by Sigrid Jacobshagen, UT-ORNL-KBRIN Bioinformatics Summit, Falls Creek, TN, 2009 (with Jennifer Forbes-Stovall, Christa Gaskill, and Claire Rinehart)

"Construction of a new Chlamydomonas phototaxis machine to investigate cryptochrome involvement in circadian clock entrainment," presented by co-author Sigrid Jacobshagen, Twelfth International Conference on the Cell and Molecular Biology of Chlamydononas, Portland, OR, 2006 (with T. Chandler)

"Imaginary Numbers in Real-World Applications," presented by student co-authors Kevin Dick and Andrew Lindsey, Posters at the Capitol, Frankfort, KY 2006

"Nonseparable 2-D Scaling Vectors of Fractal Surfaces," Kentucky Innovation and Enterprise Conference, Louisville, KY, 2005

"Wavelets and Image Compression," presented by student co-authors Justin Grieves and Matt Dawson, Posters at the Capitol, Frankfort, KY, 2005

"Circadean transcription: many different regulatory mechanisms or just a few?," presented by co-author Sigrid Jacobshagen, Eleventh International Conference on the Cell and Molecular Biology of Chlamydononas, Kobe, Japan, 2004

"Image Compression Using Scaling Vectors of Fractal Functions," Kentucky Innovation and Enterprise Conference, Louisville, KY, 2004

AWARDS AND HONORS

2017 Faculty research mentor to WKU student Andrew Davis, who received a Goldwater Scholarship

2015 WKU Housing and Residence Life Class of 2019 Award for Engagement for Ogden College

2014 Spirit of WKU Award recipient

2011 Buck$ for Bright Ideas Award recipient from the Central Region Innovation and Commercialization Center, one of 8 winners selected from 135 entries

JOURNALS REFEREED

Journal of the American Meteorological Society, 2014

Journal of Linear Algebra and Applications, 2010

Signal Processing, 2010

Journal of Biological Rhythms, 2010

Journal of Applied Mathematics and Computing, 2008

Proceedings of the 42nd Annual Hawaii International Conference on System Sciences, 2008

College Mathematics Journal, 2008

Journal of Nonlinear Analysis, 2007

Applied Mathematics Letters, 2007

Regular and Chaotic Dynamics, 2006

Applied and Computational Harmonic Analysis, 2005, 2006

Journal of Mathematical Analysis and Applications, 2005

Journal of Approximation Theory, 2005, 2006, 2007, 2008

EURASIP Journal of Applied Signal Processing, 2005

Journal of Concrete and Applicable Mathematics, 2003

The Australian and New Zealand Industrial and Applied Mathematics Journal, 2003

Journal of Fourier Analysis and Applications, 1998

PROFESSIONAL SOCIETIES

American Mathematical Society

Mathematical Association of America

Pi Mu Epsilon