

BRUCE KESSLER
Curriculum Vita – December, 2014

Department Head, Mathematics
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EDUCATION

Ph.D.	August 1997	Vanderbilt University	Mathematics
M.S.	May 1991	Vanderbilt University	Mathematics
A.B.	May 1989	Western Kentucky University	Mathematics

EMPLOYMENT HISTORY

Department Head, Mathematics	Western Kentucky University	1/13 -
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 -
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

Wavelets, Signal Processing, Software Development, Mathematical Modeling, Math Comic Books, Math Curriculum Development

PEER-REVIEWED PUBLICATIONS

“Analysis of 14-MeV neutron induced gamma ray spectra using multiwavelets,” submitted to *Radiation Measurements* (2nd author, with Alexander Barzilov (1st) and Phillip C. Womble (3rd))

“Operation Comics: Math in a Comic Book Format,” *Proceedings of the Eighth International Conference on Mathematical Creativity and Giftedness*, 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,” *Proceedings of the 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).
- “New analysis algorithm and improved automated monitoring of circadian phototaxis rhythms in *Chlamydomonas*,” *Plant Physiology and Biochemistry* **48**, 239–246 (2010) (4th author, with Christa Gaskill (1st), Jennifer Forbes-Stovall (2nd), Mike Young (3rd), 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 circadian 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,” *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).

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 accompanies the *Peaklet Analysis* software download, a joint venture with HitCents, Inc., available at <http://www.peakletanalysis.com>.

“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=AQMI7gm6vJQ.

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. Demonstrations of both tests are available at https://apps.wku.edu/tcexam/public/code/tce_login.php, with the username “demo” and the password “demo123\$”.

Operation Comics, Spring 2009, Summer 2010 through Spring 2013, 1 double-issue and 5 regular issues, with 1 in development; 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 and on iTunes U.

INVITED LECTURES

“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 Analysis: 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

“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™,” 2013 Kentucky Academy of Science Annual Meeting, Morehead, KY, 2013 (supervised the work of presenter Stephanie Hagan)

“Circulant Matrices and Cryptography,” 2013 Kentucky Mathematical Association of America Annual Meeting, Lexington, KY, 2013 (with co-presenter William Garcia)

“Operation Comics: The Story Continues,” 2011 Bridges Conference: Mathematics, Music, Art, Architecture, Culture, Coimbra, Portugal, 2011 (with 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,” 2011 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,” 2010 Kentucky Academy of Sciences Annual Meeting, Bowling Green, KY, 2010 (with presenter Justine Missik, Albert Meier, Katie Ayers, and Stuart Borrett)
- “Influences of Microbial Networks on Food Webs,” 2010 Ecological Society of America Annual Meeting, Pittsburg, PA, 2010 (with Albert Meier, 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,” 2009 Bridges Banff Conference, Banff, Alberta, Canada, 2009
- “Using Works of Visual Art to Teach Matrix Transformations,” 2009 Bridges Banff Conference, Banff, Alberta, Canada, 2009 (with presenters James Luke Akridge and Peter Hamburger, and Rachel Bowman)
- “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 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,” 2007 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 Post-secondary 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

- “*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
- “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)
- “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 Circadian Phototaxis Rhythms,” UT-ORNL-KBRIN Bioinformatics Summit, Falls Creek, TN, 2009 (with Jennifer Forbes-Stovall, Christa Gaskill, Claire Rinehart, and Sigrid Jacobshagen)

“Construction of a new Chlamydomonas phototaxis machine to investigate cryptochrome involvement in circadian clock entrainment,” Twelfth International Conference on the Cell and Molecular Biology of Chlamydomonas, Portland, OR, 2006 (with S. Jacobshagen and T. Chandler)

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

“Circadian transcription: many different regulatory mechanisms or just a few?” Eleventh International Conference on the Cell and Molecular Biology of Chlamydomonas, Kobe, Japan, 2004 (with S. Jacobshagen)

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

AWARDS AND HONORS

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

GRANTS AND CONTRACTS

“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

JOURNALS REFEREED

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

Mathematical Association of America

Kentucky Academy of Science

American Mathematical Society

PROFESSIONAL SERVICE

Department

Writer and part-time illustrator of the math comic book series “Operation Comics,” donating copies for classroom use to Cumberland Trace Elementary, Spring 2009 to present

Supervised the following MATH 498 Senior Seminar students:

- Andrew Lindsey, *Tacoma Narrows Bridge*, Spring 2006
- Kevin Dick, *How Imaginary Numbers Are Used in Engineering*, Spring 2006

Host and writer of the television program “Math Matters: Why Do I Need To Know This?” aired on WKU internal cable, www.wku.edu/mathmatters and on iTunes U, Spring 2006

American Mathematical Society Sectional Meeting Committee, Fall 2004, Spring 2005

Thesis committee member - Ilge Yazgan, Summer 2004

Undergraduate Studies Committee, director, 2002 - 2004

Departmental Webmaster, 1999 - 2004

Public Relations Committee, chair, 1998 - 2002
Public Relations/Scholarship Committee, chair, 1998-2000
Symposium Committee, chair, 2001
Technology Committee, 1998 - 2001
Correspondence Course Teacher for Math 116 and Math 117, 1999-2000
Math Bowl Committee, 1997-1998
Textbook Committee for Math 211/212, 1997-1998
Elementary/Middle School Programs Committee, 1997-98
Undergraduate Recruitment Coordinator, 1997-98

College

Ogden Sabbatical Committee, chair, 2004 - 2012
Ogden Faculty Awards Committee, chair, 2004 - 2012
Ogden Student Awards Ceremony Committee, chair, 2004 - 2012
Ogden Graduate Curriculum Committee, chair, 2004 - 2012
Lancaster-Puckett Fellowship Board, 2004 - 2012
Ogden Foundation Board liaison, 2004 - 2012
Student Appeals Committee, 2001 - 2004, chair, 2004 - 2012
TEMP Task Force, 2004 - 2006

University

University Disciplinary Committee, 2012 - present
University Scholarship Committee, 2008 - present
Scholarship Task Force, 2012
WKU Academic Technology Advisory Group, 2011 - 2012
Instruments of American Excellence Planning Committee, 2011 - 2012
Homecoming Committee, 2004 - 2012
Developed an in-house parametrized placement exam that could be accessed through TopNet for the Academic Support Department of the University College for help in placing students in the correct developmental mathematics course, Spring 2012
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, Spring 2010

Kentucky NSF EPSCoR Research Infrastructure Initiatives Subcommittee, 2007 - 2012

Co-chair of the WKU Student Research Conference Committee, 2006 - 2007

Co-coordinator of the WKU Celebration of Student Scholarship, Spring 2006

Diversity Environment Committee, 2004 - 2006

University Senate, 2002 - 2003

University Curriculum Committee (from the Senate), 2002 - 2003

Freshman Seminar Task Force, Summer 2002

Strategic Planning Committee for the Kentucky Academy of Math and Science, 2001 - 2006

Honors Committee, 2001 - 2003, 2004 - 2006

Housing Appeals Request Committee, 2001 - 2003