

**Vignon S. Oussa**  
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US Citizen

## **EDUCATION**

**Ph.D. in Mathematics** Saint Louis University, May 2012

Area of specialty: Analysis

**M.Sc. Mathematics** Southern Illinois University of Edwardsville, August 2008

Graduated with a 4.0 GPA

**B.S. Mathematics, B.S. Computer Science** Greenville College, Greenville IL, May 2005,  
Cum Laude.

## **PROFESSIONAL EXPERIENCE**

**2012 – Present** Bridgewater State University, Bridgewater, Massachusetts.

Assistant Professor of Mathematics.

## **AWARDS GRANTS AND HONORS**

**2014 – 2015** Bridgewater State University, Distinguished Faculty Research Award.

**2014 – 2015** Bridgewater State University, Course Reassignment Grant.

**2014 – 2015** Bridgewater State University, CARS Travel Grant.

**2013 – 2014** Bridgewater State University, CARS Travel Grant.

**2012 – 2013** Bridgewater State University, CARS Summer Grant.

**2012 – 2013** Bridgewater State University, CARS Travel Grant.

**2007 – 2008** Southern Illinois University of Edwardsville, Matthew Samsel Graduate Fellowship in Mathematics (best graduate student award).

**2006 – 2007** Southern Illinois University of Edwardsville, R.N. Pendergrass Graduate Student Award (best graduate student award).

**2001 – 2002** Greenville College, Freshman Mathematics Award at Greenville College.

**1998 – 1999** Cotonou, Benin, Highest score at the regional mathematics competition (all high-schools in the region of Atlantique and Oueme).

**2001 – 2004** Cotonou, Benin, Governmental scholarship for the best scores at the national exam of BAC. Amount awarded: \$50,000 used to fund undergraduate studies.

**1995 – 1996** Cotonou, Benin, National highest grade at the Brevet d'Etudes du Premier Cycle (BEPC).

## **TEACHING EXPERIENCE**

### **Bridgewater State University** Bridgewater, MA

Multivariable Calculus, Fall 2014, Fall 2015.

Complex Analysis, Spring 2016.

Advanced Linear Algebra, (Directed Study) Fall 2014, Spring 2017.

An Introduction to Representation Theory (Directed Study), Spring 2014.

Elements of Calculus II, Spring 2014, Fall 2014, Spring 2015, Spring 2016.

Abstract Algebra, Fall 2013.

Introduction to Frame Theory, Fall 2013.

Transition to Advanced Mathematics, Fall 2012, Fall 2013, Spring 2014.

Introduction to Real Analysis, Spring 2013, Spring 2015, Fall 2015, Spring 2016.

Foundations of Modern Geometry, Fall 2012, Spring 2013, Fall 2013, Spring 2014.

Selected Topics in Mathematics, Fall 2012, Spring 2013.

### **Southwestern Illinois College at Belleville** Belleville, IL.

Multivariable Calculus, Summer 2011, Spring 2014, Fall 2014, Fall 2015.

Calculus II, Fall 2011, Summer 2012.

Calculus I, Summer 2010.

Intermediate Algebra, Summer 2010, Spring 2009, Summer 2011.

College Algebra, Spring 2009, Fall 2010, Fall 2011.

Basic Algebra, Fall and Spring 2008, 2009, 2010, 2011.

### **Saint Louis University** Saint Louis, MO.

Precalculus, Fall 2010, Spring 2011, Fall 2011, Spring 2013.

Business Calculus, Fall 2009, Summer 2009, Summer 2012.

College Algebra, Spring 2009, Summer 2011.

### **Southern Illinois University of Edwardsville** Edwardsville, IL.

College Algebra, Summer 2008.

Calculus I, II, III labs, Fall 2006 - Spring 2008.

## UNDERGRADUATE MENTORING

**Summer 2017** Mentored two projects for the Adrian Tinsley Program Summer Research.

1. **Student** Sophia Maniscalco

**Title of the thesis** Algorithms for Wavelet Transforms and Application to Medical Imaging

2. **Student** Gregory Ganley

**Title of the thesis** Application of time-frequency analysis for peak detection in data

**Summer 2015** Mentored two projects for the Adrian Tinsley Program Summer Research.

1. **Student** Christopher MacDonald

**Title of the thesis** Characterizations of Four Interval Wavelet Sets

2. **Student** Arianna Zikos

**Title of the thesis** A Canonical Classification of Coordinate Systems in 3D

**Summer 2014** Mentored an Adrian Tinsley Program Summer Research.

**Student** Terry Mullen

**Title of the thesis** Application of Frames to Signal Processing

**Spring 2013** Supervised an honors' study in Foundations of Modern Geometry.

**Fall 2013** Directed an honors undergraduate thesis

**Student** Ashley Erwin

**Title of the thesis** Common Fundamental Domains for Lattices of the Same Volume

**Fall 2015-Spring 2016** Directed an honors undergraduate thesis

**Student** Christopher McDonald

**Title of the thesis** Characterizations of Four Interval Wavelet Sets and Algorithms

**Fall 2016-Spring 2017** Directed an honors undergraduate thesis.

**Student** Brian Sheehan

**Title of the thesis** Full Spark Frames

## PUBLICATIONS

- H. Führ, V. Oussa** Groups with frames of translates (submitted)
- S. Maniscalco, V. Oussa** Full spark frames arising from one-parameter groups (2018) (submitted)
- V. Oussa** Compactly supported bounded frames on Lie groups (submitted)
- V. Oussa** Localized frames on spheres (preprint)
- H. Burgiel, V. Oussa** Strictly Convex Deltahedra (submitted)
- H. Burgiel, V. Oussa** Gabor Orthonormal bases generated by indicator functions of parallelepiped shaped sets, accepted to appear in the journal of Advances in Pure and Applied Mathematics
- V. Oussa** Frames arising from irreducible solvable actions I, Journal of Functional Analysis, 2017, ISSN 0022-1236, <http://dx.doi.org/10.1016/j.jfa.2017.07.009>
- V. Oussa, Brian Sheehan** Dihedral group frames with the Haar property, Journal of Linear and Multilinear Algebra, 2017, <http://dx.doi.org/10.1080/03081087.2017.1337702>
- B. Currey, H. Fuhr, V. Oussa** A classification of continuous wavelet transforms in dimension three, Applied and Computational Harmonic Analysis, 2017, ISSN 1063-5203, <http://dx.doi.org/10.1016/j.acha.2017.06.003>
- V. Oussa** Regular Sampling on Metabelian Nilpotent Lie Groups: The Multiplicity-Free Case, Frames and Other Bases in Abstract and Function Spaces: Novel Methods in Harmonic Analysis 1 (2017): 377, published by Birkhauser/Springer in 2017 (Book Chapter)
- V. Oussa** Sampling and interpolation on some nilpotent Lie groups, Forum Math. 28 (2016), no. 2, 255-273
- V. Oussa** Decomposition of Rational Gabor Representations, Contemporary Mathematics, Contemporary Mathematics 650, 37-54 (2015)
- V. Oussa** Dihedral Group Frames which are Maximally Robust to Erasures, Linear and Multilinear Algebra, Volume 63, Issue 12, 2015
- B. Currey, A. Mayeli, V. Oussa** Sampling and Interpolation on Certain Nilpotent Lie Groups, SampTA 2015, the 11th International Conference on Sampling Theory and Applications (2015).
- B. Currey, A. Mayeli, V. Oussa** Decompositions of Generalized Wavelet Representations, Contemporary Math, American Mathematical Society, 626, 55-65 (2014).

- V. Oussa** Sinc Type Functions on a Class of Nilpotent Lie groups, *Advances in Pure and Applied Mathematics*, Volume 5, Issue 1, Pages 519 (2014).
- V. Oussa** Computing Vergne Polarizing Subalgebras, *Linear and Multilinear Algebra*, Volume 63, Issue 3; (2015).
- B. Currey, A. Mayeli, V. Oussa** Shift-Invariant Spaces on SI/Z Lie groups, *Journal of Fourier Analysis and Applications*, April 2014, Volume 20, Issue 2, pp 384-400.
- A. Mayeli, V. Oussa** Regular Representations of Time-Frequency Groups, *Math. Nachr.* 287, No. 11-12, 1320-1340 (2014).
- V. Oussa** Admissibility For Quasiregular Representations of Exponential Solvable Lie Groups, *Colloquium Math*, vol. 131, No. 2 (2013).
- D. Arnal, B. Currey, B. Dali, V. Oussa** Regularity of Abelian Linear Actions, *Contemporary Math*, American Mathematical Society 2013; 195 pp; Volume: 603.
- V. Oussa** Shannon-Like Wavelet Frames on a Class of Nilpotent Lie Groups, *Int. Jour. of Pure and Applied Mathematics*, vol. 84, No. 4 (2013).
- V. Oussa** Bandlimited Spaces on Some 2-step Nilpotent Lie Groups With One Parseval Frame Generator, *Rocky Mountain Journal of Mathematics*, Volume 44, Number 4, (2014).
- B. Currey, V. Oussa** Admissibility for Monomial Representations of Exponential Lie Groups, *Journal of Lie Theory* 22 (2012), No. 2, 481487.
- V. Oussa** Decomposition of a Quasiregular Representation of Exponential Solvable Lie Groups and Admissibility, Ph.D. thesis, Saint Louis University, (2012).
- U. Ledzewicz, V. Oussa and H. Schaettler** Optimal solutions of a model of tumor anti-angiogenesis with a penalty on the cost of treatment, *Applicationes Mathematicae*, 36 (3), (2009), pp. 295-312.
- U. Ledzewicz, V. Oussa and H. Schaettler** Model for cancer therapy with penalty on the cost of treatment, *International Journal of Pure and Applied Mathematics*, 54 (1), (2009), pp. 1-6.

## RESEARCH PRESENTATIONS

**Discrete frames arising from irreducible actions.** Colloquium at Vanderbilt University Fall 2017

**Frames arising from solvable actions.** American Mathematical Society Joint Meeting, Portland 2018

**Frames arising from solvable actions.** Seventh International Conference on Computational Harmonic Analysis, Vanderbilt University, Spring 18

- Frames arising from solvable actions.** Abstract Harmonic Analysis 201, Kaohsiung Taiwan Summer 18
- Frames of translates.** American Mathematical Society Joint Meeting, San Francisco State University, Fall 18
- Frames arising from irreducible solvable actions.** American Mathematical Society Joint Meeting, Atlanta 2017
- Why Was the Nobel Prize Winner D. Gabor Wrong?** Mathematics Colloquium Bridgewater State University, October 2016 (50 min)
- A Classification of Irreducibly Admissible Groups Acting in  $\mathbb{R}^3$ .** American Mathematical Society Sectional Meeting, North Dakota University, April 2016
- Introduction to the Theory of Frames** Colloquium at Bridgewater State University (50 min)
- Sampling and Interpolation on Some Nilpotent Lie Groups.** Aachen Germany, July 2016 (50 min)
- Sampling on some nilpotent Lie groups.** Norbert Wiener Center Seminar, University of Maryland, Spring 2015 (Guest speaker, 60 min)
- Sampling and Interpolation on Some Nilpotent Lie Groups.** Michigan State University, March 2015.
- Sinc-Type Functions on Some Nilpotent Lie Groups.** Mathematics Colloquium at Université de Bourgogne, June 2014. (30 min)
- On Common Connected Fundamental Domains of Lattices of the Same Volume.** Mathematics Colloquium at Bridgewater State University, March 2013. (60 min)
- An Abstract Harmonic Analysis Approach to Gabor Theory.** University of Maryland Baltimore County, March 2014.
- The Orbit Method and Its Applications.** Mathematics Colloquium at Dalhousie University, Halifax NS, Canada, June 2013. (60 min)
- Continuous Wavelets on Nilpotent Lie Groups.** The Functional Analytic and Representation Theoretic Foundations of Wavelet Theory, Dalhousie University, June 2013.
- Shannon-like Wavelets on Unipotent Matrices.** University of Colorado Boulder, Boulder, CO, April 2013.
- Modern Mathematical Tools in Data Transmission.** New Faculty Research Forum, Bridgewater State University, April 2013.
- Sampling and Interpolation on Some Nilpotent Lie Groups.** Virginia Tech, March 2013.

**Sinc Functions on the Heisenberg Group.** MAA Talk, November 2012.

**Homogeneous Linear Dilation Equations.** Seminar Talk at Bridgewater State University, November 2012. (60 min)

**Origami, Origami Night a Math Club Event.** Math Club Event, November 2012.

**Decomposition of a Quasiregular Representation.** PhD dissertation defense, March 2012. (60 min)

**Concepts of Admissibility and Continuous Wavelets.** Analysis Seminars, March 2012. (60 min for each talk)

**Construction of Tight Frames on Nilpotent Lie Groups.** AMS Joint Meeting, Boston, MA, January 2012

**Admissibility of Quasiregular Representations.** Saint Louis, MO, February 2011. (60 min)

**Wavelets From a Representation Theory Viewpoint.** Southern Illinois University, Edwardsville, IL, October 2011. (60 min)

## SCIENTIFIC VISITS

**July 2016** Visited RWTH Aachen University, Aachen Germany.

**August 2012** Visited the Mathematics Department of University of Bourgogne, France.

**May 2013** Visited the Mathematics Department of CUNY, New York, NY.

**June 2013** Visited the Department of Mathematics, Halifax NS, Canada.

**June 2014** Visited the Mathematics Department of University of Bourgogne, France.

## PROFESSIONAL ACTIVITIES AND SERVICE

**Member** of search committee for a tenure-track position, 17-18

**Reviewer** for the following journals and conferences: Axioms, Monatshefte für Mathematik, Integral Transforms And Special Functions, Afrika Mathematika, Sampta, Journal of Mathematical Analysis and Applications.

**Organizer** of Math Chats, Fall 2012, Spring 2013, Fall 2013, Spring 2014, Fall 2014, Spring 2015, Fall 2015, Spring 2016, Fall 2016, and Spring 2017.

**Adviser** of the Math Club, Fall 2016, Spring 2017.

**Chair** of Search committee for two tenure-track positions, 2015-2016.

**Chair** of Search committee for two tenure-track positions, 2014-2015.

**Serving** on the advisory board of Undergraduate Research (university-wide committee),  
Fall 2014–Present.

**Coordinator** of Elements of Calculus I and Elements of Calculus II.

**Serving** in the Mathematics Assessment Committee at Bridgewater State University, Fall  
2013–Present.

**Coordinator** of Math 180 (Transition to Advanced Mathematics) Spring 2013.

**Advisor** of African Student Association of Bridgewater State University.

**Coordinator** of Internship and job opportunities for math majors, Fall 2012, Spring 2013,  
Fall 2013, Spring 2014, Spring 2015, Fall 2015, Spring 2016

**Served in** the Math Undergraduate Curriculum Committee (MUCC), Fall 2012, Spring  
2013.

**Served in** of the Undergraduate Curriculum Committee (UCC), Spring 2013.

**Co-adviser** of the Math Club, Fall 2012, Spring 2013.

**Co-organizer** of the 2013 Canadian Mathematical Society Summer Meeting, June 2013.

**Author of Reviews of Math Articles** for the Mathematical Reviews database Zentral-  
blatt.

**Author of Reviews of Math Articles** for MathSciNet - American Mathematical Soci-  
ety.