

# Deanna Colonna Easley

## *Curriculum vitae*

✉ Department of Mathematical Sciences  
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### EDUCATION

PH.D. CANDIDATE IN MATHEMATICS, Expected graduation: May 2022, George Mason University,  
Dissertation: *Higher Order Kalman Filtering for Nonlinear Systems*, Advisor: Dr. Tyrus Berry

M.S. IN MATHEMATICS, May 2017, George Mason University

B.S. (SUMMA CUM LAUDE) IN MATHEMATICS, Minor in Italian, May 2015, George Mason University

### RESEARCH INTERESTS

NUMERICAL ANALYSIS: approximation of tensor eigenvalues and eigenvectors, tensor decomposition and numerical integration/cubature

DYNAMICAL SYSTEMS: data assimilation, inverse problems, prediction/control, and uncertainty quantification.

### PUBLICATIONS

- Deanna Easley and Tyrus Berry, *A Higher Order Unscented Transform*. In press at SIAM/ASA Journal on Uncertainty Quantification (JUQ), 2021. <https://arxiv.org/abs/2006.13429>

We develop an approach for estimating the expected values of nonlinear functions applied to multivariate random variables with arbitrary distributions. In order to overcome a long standing issue of improving upon and generalizing the unscented transform by creating a new quadrature that matches not only the mean and covariance but also any given skewness and kurtosis tensors (and potentially arbitrarily many moments), we introduce the higher order unscented transform (HOUT). The nodes of the HOUT are formed using the tensor CP decompositions of the moments, and we present a practical algorithm for computing a non-minimal CP decomposition of tensors and the first rigorous proof of convergence in linear time. The unscented transform is used in many areas of uncertainty quantification such as filtering, smoothing, and parameter estimation, and our generalization can help improve all these methods.

- Deanna Easley, Andrew Kim, and Tyrus Berry, *Tensor Eigenvalues and Inequalities*. In process.

### TALKS AND CONFERENCES

- August 27, 2021: Dynamics Days Europe 2021. *Generalizing the Unscented Ensemble Transform to Higher Moments*.
- August 24-27, 2020: Dynamics Days Digital 2020. *Generalizing the Unscented Ensemble Transform to Higher Moments*.
- August 14, 2020: SIAM Conference on Mathematics of Planet Earth (MPE20). *Generalizing the Unscented Ensemble Transform to Higher Moments*.
- November 22, 2019: Student Research Talks, George Mason University. *Generalizing the Unscented Ensemble Transform to Higher Moments*.
- February 26, 2019: Mathematics and Climate Seminar, George Mason University. *Lorenz Equations*.

## SOFTWARE PACKAGES DEVELOPED

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- Higher Order Unscented Transform (HOUT)

This Matlab code computes the weights and nodes of the Higher Order Unscented Transform and is available at <https://dceasley.github.io/code/HOUT.zip>

## ORGANIZATIONS

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*Association for Women In Mathematics (GMU Chapter)*

PRESIDENT April 2020 - Present

TREASURER March 2018 - April 2020

VICE PRESIDENT April 2017 - March 2018

## TEACHING AND RESEARCH EXPERIENCE

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AUG 25, 2018 – PRESENT	<b><i>Research Assistant</i></b> George Mason University, Fairfax Researching higher order methods in data assimilation with Dr. Tyrus Berry
MAY 25, 2019 – JUN 24, 2019	<b><i>Course Instructor</i></b> George Mason University, Fairfax Taught Precalculus (Math 105).
MAY 25, 2018 – JUN 24, 2018	<b><i>Course Instructor</i></b> George Mason University, Fairfax Taught Precalculus (Math 105).
JAN 10, 2018 – MAY 24, 2018	<b><i>Teaching Assistant</i></b> George Mason University, Fairfax Taught three recitations of Analytic Geometry and Calculus III (Math 213) for Instructor Nacir Hmidouch and one recitation of Elementary Differential Equations (Math 214) for Adjunct Prof. Christopher Paldino.
AUG 25, 2017 – JAN 9, 2018	<b><i>Teaching Assistant</i></b> George Mason University, Fairfax Taught three recitations of Analytic Geometry and Calculus III (Math 213) for Dr. Thomas Wanner and three recitations of Analytic Geometry and Calculus I (Math 113) for Dr. Flavia Colonna.
JAN 10, 2017 – MAY 24, 2017	<b><i>Teaching Assistant</i></b> George Mason University, Fairfax Taught three recitations of Analytic Geometry and Calculus III (Math 213) for Asst. Prof. Kumnit Nong.
JAN 22, 2017 – MAY 27, 2017	<b><i>Grader</i></b> George Mason University, Fairfax Graded Linear Algebra (Math 203) exams for Dr. Neil Epstein.
AUG 25, 2016 – JAN 9, 2017	<b><i>Teaching Assistant</i></b> George Mason University, Fairfax Taught two recitations of Analytic Geometry and Calculus III (Math 213) for Dr. Igor Griva and one recitation of Analytic Geometry and Calculus III Honors (Math 215) for Dr. Robert L. Sachs.
MAR 20, 2016 – MAY 28, 2016	<b><i>Grader</i></b> George Mason University, Fairfax Graded Introductory Calculus with Business Applications (Math 108) quizzes and tests for Prof. Karen L Crossin.
AUG 31, 2015 – DEC 26, 2015	<b><i>Grader</i></b> George Mason University, Fairfax Graded Linear Algebra (Math 203) homework for Dr. Jeng-Eng Lin.

## **SOFTWARE SKILLS**

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EXPERT MATLAB

GOOD LEVEL L<sup>A</sup>T<sub>E</sub>X, HTML, Word, PowerPoint

INTERMEDIATE Python

BASIC LEVEL Java, Excel

## **AWARDS**

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### **2021 Clarke Family Award for Excellence in Algebra, Analysis, and Topology**

This award was established in 2015 by Robert W. Clarke to provide scholarships to encourage and recognize graduate student excellence in the study of mathematics and carries a monetary prize of \$1,000.

### **2015 William Weaver Prize in Italian Studies**

This award was established in the name of the late pre-eminent translator of Italian literature into English and recognizes the academic achievements of students of Italian. It is a monetary prize in the amount of \$1,000.

### **2015 Excellence in Advanced Italian**

This award recognizes one's progress and efforts at study of Italian language and culture at the advanced level for the 2014-2015 academic year.

### **2014 Excellence in Advanced Italian**

This award recognizes one's progress and efforts at study of Italian language and culture at the advanced level for the 2013-2014 academic year.

## **HONORS**

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### **SPRING 2015 Phi Beta Kappa Society**

### **FALL 2012 Delta Alpha Pi International Honor Society**

### **2011-2015 Dean's List**

## **COMMUNICATION SKILLS**

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ENGLISH Native speaker

ITALIAN Good

FRENCH Fair

## **INTERESTS**

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- I enjoy making origami that display mathematical concepts and in fact, I have been regularly running origami workshops as a community building session for math majors while a part of AWM.
- I have a deep appreciation of geology, particularly with regard to the human and animal evolution as well as the study of climate, which is an important application of my research.
- I have a strong passion for drawing, and get inspiration from ancient and medieval history, and myth.

