

## David McMorris

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CONTACT INFORMATION	david.mcmorris@huskers.unl.edu <a href="https://davidmcmorris.github.io/">https://davidmcmorris.github.io/</a>
RESEARCH INTERESTS	Mathematical biology, focused on applications of control theory to plant life history and ecology. Additional interests in scientific computing and computational fluid dynamics.
EDUCATION	<b>University of Nebraska-Lincoln</b> Ph.D. in Mathematics August 2020 Advisor: Glenn Ledder Dissertation: <i>Optimal Allocation of Two Resources in Annual Plants</i> M.S. in Mathematics May 2016  <b>Hope College</b> B.S. in Mathematics May 2014 <i>Magna Cum Laude</i> Advisor: Brian Yurk
HONORS AND AWARDS	<b>Parents' Recognition Award</b> , UNL 2017 Nominated by parents for making a difference in the lives of their students. <b>Outstanding Qualifying Exam</b> , UNL 2015 <b>Othmer Fellowship</b> , UNL 2014 Merit-based three-year fellowship awarded to incoming graduate students. <b>Albert E. Lampen Mathematics Prize</b> , Hope College 2014 Awarded annually to two graduating seniors in mathematics. <b>Member of Phi Beta Kappa</b> inducted 2014 <b>Member Pi Mu Epsilon</b> , Michigan Delta chapter inducted 2014 <b>John H. Kleinheksel Mathematics Award</b> , Hope College 2012 Awarded annually to select sophomore-level mathematics majors. <b>Presidential Scholarship</b> , Hope College 2010 Merit-based scholarship at Hope College
PUBLICATIONS	1. D. McMorris, P. Pearson, and B. Yurk, <i>A modified wavelet method for identifying transient features in time signals with applications to bean beetle maturation</i> . Involve, a Journal of Mathematics, <b>10(1)</b> (2016), 21-42.
PRESENTATIONS † DENOTES INVITED TALK	† <i>Plant Life History and Optimal Control</i> (20 min) Nebraska Wesleyan University Math Club November 2019 † <i>Investigating Plant Growth Through Mathematical Biology</i> (50 min) Nebraska Wesleyan University STEM Seminar March 2019

- † *Using Optimal Control Theory to Model Resource Allocation in Annual Plants*  
(50 min)  
Creighton University Department of Mathematics Colloquium    November 2018
- An Optimal Control Approach to Resource Allocation in Annual Plants*  
(50 min)  
UNL MathBio Seminar    October 2018
- An Application of Optimal Control to Resource Allocation in Annual Plants*  
(20 min)  
Midwest Mathematical Biology Conference, UW - La Crosse    May 2018
- † *Optimal Control Theory and Math Biology*  
(10 min)  
Nebraska Wesleyan University Math Club    October 2017
- † *Modified Wavelet Methods for Identifying Transitions in Bean Beetle Maturation*  
(Poster)  
Hope College Celebration of Undergraduate Research    April 2014  
† Michigan Mathematics Prize Competition Awards Day    March 2014
- † *Identifying Transitions in Bean Beetle Maturation Using Modified Wavelet Methods*  
(15 min)  
† Hope College Mathematics Department Colloquium    October 2013  
Midstates Consortium for Math and Science Undergraduate Research  
Symposium, University of Chicago    October 2013

#### TEACHING EXPERIENCE

##### **Instructor of Record**

- Math 302: Math Modeling    Spring 2017, 2019, 2020  
A course for pre-service elementary teachers.
- Math 104: Applied Calculus (~ 110 students)    Fall 2019
- Math 106: Calculus I    Fall 2018  
Part of the WHT Scholars Learning Community for first-generation Nebraska college students
- Math 203: Contemporary Mathematics    Spring 2018
- Math 301: Geometry Matters    Summer 2017  
A course for pre-service elementary teachers.
- Math 103: College Algebra & Trigonometry    Fall 2016, 2017  
Part of the WHT Scholars Learning Community for first-generation Nebraska college students
- Math 101: College Algebra    Fall 2015, Spring 2016, Summer 2016

##### **Teaching Assistant**

- Math 107: Calculus II Recitation    Spring 2015
- Math 106: Calculus I Recitation    Fall 2014, Summer 2015

##### **Qualifying Exam Workshops**

- Organized workshops for first-year graduate students to prepare for qualifying exams
- PDE and Applied Math Workshop    May 2018
- ODE and Applied Math Workshop    May 2017

## Grader

Math 489/889: Stochastic Processes	Fall 2018
Math 831: Partial Differential Equations	Fall 2017
Math 842: Methods in Applied Mathematics	Fall 2016
Math 104: Applied Calculus	Spring 2015

## RESEARCH EXPERIENCE

### University of Nebraska – Lincoln 2016 - Present

Dissertation Research; Advisor: Glenn Ledder

Optimal control theoretical approach to resource allocation in annual plants

- Developed a two-resource model for resource allocation in annual plants.
- Used optimal control theory to determine the growth trajectory that maximizes fruit production over the course of a growing season. (in progress)
- Implemented numerical methods to simulate the model in MATLAB.

### University of Nebraska – Lincoln Summer 2018

Graduate Research Assistant; Advisor: Adam Larios

Regularity of solutions to fractional Benjamin-Bona-Mahony equation

- Used numerical techniques to investigate the effects of incorporating a fractional differential operator on the smoothness of solutions to the BBM equation.

### Hope College 2013-2014

Undergraduate Research Assistant; Advisor: Brian Yurk

Studied effects of climate change on growth of embryonic *Callosobruchus maculatus*

- Developed and implemented laboratory protocol for exposing embryos to varying environmental conditions and collecting data via digital microscopy.
- Employed a modified wavelet image processing algorithm with R and Java to examine effects of climate variation on the timing of key transition points in embryonic development.

## SERVICE

### New Student Enrollment, UNL Summer 2019, 2020

Worked with academic advisors and incoming freshmen to determine their math placement based on their backgrounds and major requirements.

### Nebraska Conference for Undergraduate Women in Mathematics,

Department of Mathematics, UNL January 2019, 2020

NCUWM is an annual conference open to undergraduate women mathematicians.

I volunteered to assemble informational packets and register conference attendees.

### Dean Search, College of Arts and Sciences, UNL January 2019

Served on a panel of 10 students who met with and evaluated each candidate.

### Math Day, Department of Mathematics, UNL Annually Since November 2014

Proctored/coordinated throughout a day of high school mathematics competitions for approximately 1400 students across Nebraska.