David McMorris

CONTACT Department of Mathematics david.mcmorris@cnu.edu
INFORMATION To the Property of Mathematics david.mcmorris@cnu.edu

Luter Hall 340 https://davidmcmorris.github.io/

Christopher Newport University

One Avenue of the Arts Newport News, VA 23606

RESEARCH INTERESTS

Mathematical biology and scientific computing, applications of control theory to plant

life history and ecology.

EDUCATION University of Nebraska-Lincoln

Ph.D. in Mathematics August 2020

Advisor: Glenn Ledder

Dissertation: Optimal Allocation of Two Resources in Annual Plants

M.S. in Mathematics May 2016

Hope College

B.S. in Mathematics May 2014

Magna Cum Laude Advisor: Brian Yurk

APPOINTMENTS Adjunct, Christopher Newport University August 2021 - present

Graduate Teaching Assistant, UNL 2014 - 2020

Teaching Instructor of Record

EXPERIENCE Christopher Newport University

Math 130: Precalculus Spring 2022

Math 135: Calculus for Business and Social Sciences Fall 2021, Spring 2022

University of Nebraska-Lincoln

Math 302: Math Modeling Spring 2017, 2019, 2020

A course for pre-service elementary teachers.

Math 104: Applied Calculus ($\sim 110 \text{ students}$) Fall 2019

Math 106: Calculus I Fall 2018

Part of the WHT Scholars Learning Community for first-generation 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 students

Math 101: College Algebra Fall 2015, Spring 2016, Summer 2016

Teaching Assistant

University of Nebraska-Lincoln

Math 107: Calculus II Recitation Spring 2015

Math 106: Calculus I Recitation Fall 2014, Summer 2015

Qualifying Exam Workshops

University of Nebraska-Lincoln

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

University of Nebraska-Lincoln

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

Publications And Preprints

- 1. D. McMorris and G. Ledder, *Resource Allocation in Annual Plants*. (submitted) bioRxiv 2021.04.19.440512.
- 2. D. McMorris, P. Pearson, and B. Yurk, A modified wavelet method for identifying transient features in time signals with applications to bean beetle maturation. Involve, a Journal of Mathematics, 10(1) (2016), 21-42.

Presentations

† DENOTES INVITED TALK

Optimal Allocation of Two Resources in Annual Plants

(50 min)

UNL, Dissertation Defense

July 2020

† Plant Life History and Optimal Control

(20 min)

Nebraska Wesleyan University Math Club

November 2019

† Investigating Plant Growth Through Mathematical Biology

(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 Weslevan 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 † Hope College Mathematics Department Colloquium October 2013 Midstates Consortium for Math and Science Undergraduate Research Symposium, University of Chicago October 2013 University of Nebraska-Lincoln 2016 - 2020 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. - Implemented numerical methods to simulate the model in MATLAB. Summer 2018 University of Nebraska-Lincoln 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. 2013-2014 Hope College 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. Parents' Recognition Award, UNL 2017 Nominated by parents for making a difference in the lives of their students. Outstanding Qualifying Exam, UNL 2015 Othmer Fellowship, UNL 2014 Merit-based three-year fellowship awarded to incoming graduate students. Albert E. Lampen Mathematics Prize, Hope College 2014 Awarded annually to two graduating seniors in mathematics. Member of Phi Beta Kappa inducted 2014 Member Pi Mu Epsilon, Michigan Delta chapter inducted 2014

Research

EXPERIENCE

Honors and

AWARDS

Presidential Scholarship, Hope College Merit-based scholarship at Hope College

Awarded annually to select sophomore-level mathematics majors.

2012

2010

John H. Kleinheksel Mathematics Award, Hope College

SERVICE MCM/ICM,

Consortium for Mathematics and Its Applications

Spring 2021, 2022

Worked as a triage judge to grade papers as part of the Interdisciplinary Contest in Modeling and Mathematical Contest in Modeling, international modeling contests which challenge students to engage with open-ended problems.

Referee, Letters in Biomathematics

Since 2021

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

November 2014 - 2019

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