

Danilo R. Diedrichs, Ph.D.

Expanded Curriculum Vitae

Department of Mathematics and Computer Science
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1. Education

Ph.D., Applied Mathematical and Computational Sciences, University of Iowa, Iowa City, IA, 2007-2012.

M.S., Mathematics, University of Iowa, Iowa City, IA, 2007-2009.

Diplôme EPF d'Ingénieur en Génie Civil, Ecole Polytechnique Fédérale de Lausanne, Lausanne, Switzerland, 1992-1997. Equivalent to a M.S. in Civil Engineering*.

Maturité Fédérale Scientifique et Latine, Collège Rousseau, Geneva, Switzerland, 1988-1992. Equivalent to U.S. undergraduate coursework in science, Latin, and modern languages*.

* Evaluated independently by the Center for Educational Documentation, Inc. and World Education Services, Inc.

2. Professional Experience

Wheaton College, Wheaton, IL. Professor of Mathematics, 2023-present
Associate Professor of Mathematics, 2018-2023
Assistant Professor of Mathematics, 2012-2018
Tenured since 2019.

University of Iowa, Iowa City, IA. Mathematics Instructor and Graduate Fellow, 2007-2012.

Hancock International, Carol Stream, IL. Operations specialist and customs compliance officer, 2004-2007.

Panalpina AIT Worldwide Logistics / Argents Express, Elk Grove Village, IL. Supply Chain Logistics Operations Team Lead, 1998-2004.

3. Courses Taught at Wheaton College

Calculus I, II, and Vector Calculus (Math 231-234 and Math 331)

Differential Equations (Math 333)

Linear Algebra (Math 245)

I restructured the curriculum and changed the textbook to incorporate applied projects and introduce abstract vector spaces and proofs earlier in the course.

Introduction to Upper-Level Mathematics (Math 301)

The expanded scope of this course includes: history and philosophy of mathematics, vocations in mathematics, reading and researching pure and applied math from primary literature sources, writing and presenting mathematics. I designed the curriculum starting in 2012. In 2015, the course was expanded from 1 to 2 credit hours and became a required course for all students in the mathematics

major. In 2020-2021, I co-authored a joint textbook for this course and Introduction to Proofs (Math 241) with Dr. Stephen Lovett, under the title "Transition to Advanced Mathematics".

Mathematical Modeling (Math 364)

I created this course to support the modeling requirement for the Applied Mathematics concentration. This course teaches mathematical modeling techniques used in the natural and social sciences, i.e., to describe a real-world problem in a mathematical framework based on experimental data, and to use a mathematical approach to finding solutions. The course is divided into four sections: empirical modeling (including curve fitting, interpolation, and regression), mechanistic modeling based on differential equations, stochastic modeling (including random variables and simulation), and operations research (including linear and nonlinear programming). The course introduces analytical and numerical methods and applies them to case studies in biology, ecology, economics, engineering, epidemiology, meteorology, pharmacology, physics, sociology, and supply chain logistics. This course has become a popular course within the mathematics major and among pursuing a double major or a math minor.

Partial Differential Equations (Math 433)

I developed this course as an advanced elective for students in mathematics, physics and engineering with applications in heat diffusion, fluid flow, waves (sound, electromagnetic), transport phenomena, and quantum mechanics. The course focuses on analytical methods for solving partial differential equations with extensions into Fourier theory, L^2 theory, and Sturm-Liouville theory.

Mentored Research (Math 493)

I designed the curriculum so that all students in the course have the experience of participating in a semester-long project of original research in applied mathematics mentored by faculty. Students participate individually or in teams of 2 or 3, going through all phases of a research project: defining the topic and scope, generating and submitting a project proposal, literature search, data collection, mathematical modeling, simulations and computation, generating a complete manuscript, designing a poster, and presenting the project orally at regular intervals throughout the semester.

4. Approved Sabbatical and other Academic Leaves from Wheaton College

Sabbatical semester, Spring 2020. Attended graduate courses at the Ecole Polytechnique Fédérale de Lausanne (Lausanne, Switzerland) titled *Mathematical Modeling of DNA* and *Dynamics and Bifurcation*. Collected information for the *Mathematical Culture* portion of the book *Transition to Advanced Mathematics* I co-authored with Steve Lovett.

5. Professional Honors or Recognition

Senior Teaching Achievement Award, Wheaton College, 2022.

Tenure, Wheaton College, 2019.

Promotion to Associate Professor, Wheaton College, 2018.

CCCU Research Grant awarded for research in Christian humanitarian logistics, 2017-2020.

Junior Faculty Development Grant awarded for research and scholarly work, 2017-2018.

Robert E. Witte endowed Project NExT Fellow for the New Experiences in Teaching (NExT) program sponsored by the Mathematical Association of America (MAA), 2012-2013.

Certificate in Computational Cell Biology awarded by Cold Spring Harbor Laboratories, Cold Spring Harbor, NY, 2010.

Outstanding Teaching Assistant Award awarded by the Council on Teaching and Office of the Provost, University of Iowa, 2010.

6. Publications, Creative Accomplishments, Performances, Research

6.1 Books authored

Diedrichs, Danilo R. and Lovett, Stephen (2021), *Transition to Advanced Mathematics*, Taylor & Francis.

6.2 Peer-reviewed publications

Diedrichs DR, Hill A, Li Y, Miller A (2023), *Dynamical simulation of the Syrian refugee crisis: Quantifying the driving factors of forced migration*, Simulation (submitted).

Larson J, Isihara P, Flores G, Townsend E, Diedrichs DR, Baars C, Kwon S, McKinnon W, Nussbaum J, Steggerda C, Yan J (2020), *A priori assessment of a smart-navigated unmanned aerial vehicle disaster cargo fleet*, Simulation, Vol. 96(8):641-653.

Isihara P, Shi C, Ward J, O'Malley L, Laney S, Diedrichs DR, Flores G (2020), *Identifying most typical and most ideal attribute levels in small populations of expert decision makers: Studying the Go/No Go decision of disaster relief organizations*, Journal of Choice Modelling, Vol. 35(2020):100204.

Kartawijaya T, Townsend E, Tully K, Isihara P, Diedrichs DR, Flores G, Shi C, Ward J (2019), *Is now the time to invest in emergency smart-navigated multiple-response quadcopter fleets?*, Journal of Unmanned Vehicle Systems, Vol. 7(2):145-155.

Diedrichs DR (2019), *Using harvesting models to teach modeling with differential equations*, PRIMUS Journal, Vol. 29(7):712-723.

Diedrichs DR (2019), *Mathematics Reveals Patterns that Reflect the Orderly Character of God*, Perspectives on Science and Christian Faith, Vol. 71(2):107-118.

Diedrichs DR (2019), *Archimedean, Logarithmic, and Euler spirals: Intriguing and ubiquitous patterns in nature*, The Mathematical Gazette, Vol. 103(556):52-64.

Diedrichs DR, Gomez JA, Huang C, Rutkowski DT, Curtu R (2018), *A Data-Entrained Computational Model for Testing the Regulatory Logic of the Vertebrate Unfolded Protein Response*, Molecular Biology of the Cell, Vol. 29(12):1502-1517.

Isihara P, Diedrichs DR, Kartawijaya T, Townsend E, Tully K (2017), *Disaster Relief Modeling*, The UMAP Journal, Vol. 38(4):399-430.

Diedrichs D, Dinkins H, Edman J, Flora S, Isihara PA, McNeill C, Swain E, Thomas H and Varberg N (2016), *Number Parity Duality, Non-Distributivity, and a Nonlinear Error-Correcting Code*, Pi Mu Epsilon Journal, Vol. 14(5):307-313.

Carlson CE, Isihara PA, Sandberg R, Boan D, Phelps K, Lee KL, Diedrichs DR, Cuba D, Edman J, Gray M and Hesse R (2016) *Introducing PEARL: A Gini-like index and reporting tool for public accountability and equity in disaster response*. *Journal of Humanitarian Logistics and Supply Chain Management*, 6(2):202-221.

Diedrichs D, Phelps K, Isihara P (2016) *Quantifying Communication Effects in Disaster Response Logistics: A Multiple Network System Dynamics Model*, *Journal of Humanitarian Logistics and Supply Chain Management*, 6(1):24-45.

Diedrichs D, Isihara P and Buursma D (2014) *The Schedule Effect: Can Recurrent Peak Infections be Reduced without Vaccines, Quarantines or School Closings?*, *Mathematical Biosciences*, 248:46-53.

Arendsdorf AM, Diedrichs D and Rutkowski DT (2013) *Regulation of the Transcriptome by ER Stress: Non-Canonical Mechanisms and Physiological Consequences*, *Frontiers in Genetics*, 4:256.

Curtu R and Diedrichs D (2010) *Small-Scale Modeling Approach and Circuit Wiring of the Unfolded Protein Response in Mammalian Cells*, *Advances in Computational Biology, Advances in Experimental Medicine and Biology* 680, H.R. Arabnia Ed., Springer, pages 261-274.

6.3 Mentored Undergraduate Research Projects

Modeling refugee migration: A graph dynamical system approach with a case study in the Middle East and North Africa from 2006 to 2019 (2021). Students: Avyi Hill '23, Yeting Li '23, Amelia Miller '23.

The dynamics of Delayed Onset Muscle Soreness: Mechanistic analysis based on the pharmacokinetics of creatine kinase and empirical assessment of risk of exertional rhabdomyolysis after long-distance running (2021). Student: Jonah Jones '21.

Analysis and suggestions for improvement in the Irish dance scoring and judging systems (2021). Student: Willow Vander Kooi '23.

Sales Performance Analysis of Frito-Lay Route Sales Representatives in Knoxville, TN based on Social Network Analysis (2019). Students: Christian Cameron '21, Chris Plimpton '21.

The Anti-Vaccination Movement's Possible Deteriorative Effect on the Herd Immunity of Measles in a Major United States City (2019). Students: Andy Holmberg '21, Jonathan Ward '20.

Impact of Immigration on Unemployment Rate and Per Capita GDP in U.S. States with a Large Immigrant Population (2019). Students: Kailey Mulligan '20, Kiki Rogers '21.

Statistical and Dynamical Analysis of the relationship between Crime Rates and Education in Cicero, Illinois (2017). Students: Michaela Flitsch '19, Courtney Linscott '19, Mark Nussbaum '19.

Mathematical model for Student Zipcar Demand on the campus of Wheaton College (2017). Students: Michelle Chuang '19, Sara Magnuson '19.

Quantifying the Impact of Health Professionals on the Short-term Mental Health of Disaster Victims through Disaster Response Logistics (2017). Students: Christy Baars '19, Sarah Denne '18.

Agent-based model for the Spread of Malaria in Refugee Camps (2017). Students: David Bakalemwa '19, David Gray '19.

Additive Benefit of Quantitative Radiomics in Distinguishing between Benign Lesions and Luminal A Cancer Subtypes on a large Clinical Breast MRI Dataset (2017). Student: Nathan Taylor '19.

A mathematical model of gang membership in North Lawndale accounting for rehabilitation and fringe crime imprisonment (2015). Students: Nate Annen '17, Jacob Clement '17.

Exploratory analysis of a High-Speed Intercity Passenger Rail in the Midwest (2015). Students: Miriam Agamah '17, Kyu Lim Lee '17.

Clustering trends of overweight obesity in students in Dupage County (2015). Students: Melissa Gray '17, Robin Kong '16.

Agent-based simulation of crime in society (2015). Students: Johnny Edman '17, Richard Ndekezi '17.

A Mathematical Model for the Growth and Decline of the Church in DuPage County (2013). Student: Daniela Cuba '15.

Constrained Optimization Model for Quantitative Criminology (2013). Student: Korey Clement '15.

Development of an Application for Indoor Temperature Control Efficiency (2013). Student: Roland Hesse '16.

Computational Composition of Traditional Scottish Music (2013). Student: Tim MacDonald '14.

Inventory Models in Disaster Relief (2012). Student: Nate Veldt '13.

7. Other Significant Professional Activities

7.1 Presentations

Conjoint analysis approach for defining part worth utilities to criteria weighing into the "go/no-go" decision faced by NGOs in disaster response (poster), **MathFest Conference**, Cincinnati, OH, Aug. 2, 2019.

Inquiry-oriented approach to teaching differential equations through modeling projects. **MathFest Conference**, Cincinnati, OH, Aug. 1, 2019.

Using harvesting models to teach modeling techniques, bifurcation analysis, and solution methods in ordinary differential equations. **MathFest Conference**, Chicago, IL, July 27, 2017.

Quantifying Communication Effects in Disaster Response Logistics: A Multiple Network System Dynamics Model. **Joint Mathematics Meetings**, Atlanta, GA, January 6, 2017.

Clustering Trends of Overweight and Obesity in Students in DuPage County. **DuPage County Health Department**, Wheaton, IL, April 23, 2015.

The Schedule Effect: Can Recurrent Peak Infections be Reduced without Vaccines, Quarantines or School Closings? (poster) **Midwest Mathematical Biology Conference**, University of Wisconsin La Crosse, May 17-18, 2014.

Mathematical Model for the Unfolded Protein Response to Stress in the Endoplasmic Reticulum of Mammalian Cells. (poster) **Nonlinear Dynamics and Stochastic Methods conference**, Pittsburgh, PA, March 10-12, 2014.

The Schedule Effect: Can Recurrent Peak Infections be Reduced without Vaccines, Quarantines or School Closings? **Joint Mathematics Meetings**, Baltimore, MD, January 17, 2014.

Reverse Engineering of the Unfolded Protein Response Network using Polynomial Dynamical Systems. **Joint Mathematics Meetings**, San Diego, CA, January 9, 2013.

7.2 Professional Organizations

American Scientific Affiliation, Fellow, 2021-present

Member, 2017-present.

Annual Meeting Organizing Co-Chair, Wheaton , IL, July 19-22, 2019.

Association of Christians in the Mathematical Sciences, Member, 2022.

Mathematical Association of America, Member, 2012-present.

7.3 Judging

Student Research Presentation Competition, Judge. MathFest, Hartford, CT, 2013.

Student Research Poster Competition, Judge. Joint Mathematics Meetings, San Diego, CA, 2013.

Biomathematics and Ecology Education and Research (BEER) student competition, Judge. Online, 2013.

7.4 Workshops attended

Informed Compassion – How Faith Shapes Decisions in Christian Relief, Gordon College, Wenham, MA, July 24-26, 2018.

Informed Compassion – How Faith Shapes Decisions in Christian Relief, Wheaton College, July 2017.

Teaching Modeling-First Differential Equations – Technology and Complete End Game Efforts, Joint Mathematics Meetings, Atlanta, GA, January 5-7, 2017.

7.5 Journal refereeing

PRIMUS journal, Referee. 2022.

International Journal of Dynamical Systems and Differential Equations, Referee. 2019-2021.

Perspectives on Science and Christian Faith, Referee. 2020.

UMAP Journal, Referee. 2019.

Journal of Humanitarian Logistics and Supply Chain Management, Referee. 2016.

8. Institutional Service

8.1 Committee Assignments

Academic Policies Committee, Chair, 2021-2023.

Faculty Council, Member, 2021-2023.

Transfer Student Task Force, Member, 2023.

Curricular Policies Working Group, Member, 2021.

Strategic Investments in STEM, Data Science committee, Member, 2021-present.

Strategic Planning Steering Committee, Member, 2019.

Dean of Natural Sciences Search Committee, Member, 2019.

CATC Thematic Core Subcommittee (Curriculum Committee), Chair, 2018-2019.

Curriculum Committee, Member, 2016-2019.

College Life and Enrollment Committee, Member, 2015.

Hearing Panel for Student Conduct, Member, 2013-2015.

CATC Thematic Core Working Group, Member, Applied and Abstract Quantitative Reasoning, 2015.

8.2 Academic Advising

Academic adviser. 47 advisees in the mathematics major.

8.3 Chapel Speaking

Invited chapel speaker. Message titled *The Search for Vocation*, October 10, 2014.

8.4 Honor Theses

Reader, Honors thesis of Stephen McKay '21 in Astrophysics, 2021.

Reader, Honors thesis of April Futch '18 in Plasma physics, 2018.

Reader, Honors thesis of James Tarka '15 in Astrophysics, 2015.

Reader, Honors thesis of Cole Adams '13 in Astrophysics, 2013.

8.5 Faculty Evaluations of Teaching

For Peter Jantsch (Mathematics & Computer Science Department), Oct. 2022.

For David Hsu (Physics & Engineering Department), Oct. 2022.

For Nick Guo (Business & Economics Department), Oct. 2021.

For Allison Dick (Chemistry Department), Oct. 2020.

8.6 Seminars

OPUS Vocation Seminar, Participant. Fall 2018.

8.7 Student Associations

Society for Women in Science (Wheaton College student club), Faculty adviser, 2021-present.

Society for Women in Science (Wheaton College student club), Invited panelist, *Applying for STEM jobs and internships*, March 21, 2022.

Society for Women in Science (Wheaton College student club), Invited panelist, *STEM after College*, Society for Women in Science, Oct. 26, 2021.

Greenhouse High School Engineering Club, Invited speaker, Oct. 25, 2020.

Youth Hostel Ministry (Wheaton College), Invited lecturer, *Young Adult Culture and Spirituality in Western Europe*, 2015-2016.

Mu Kappa (Wheaton College student club for Third Culture Kids), Student Leader Mentor, 2014-2016.

8.8 Departmental Service

Department Chapel, Worship leader and organizer, 2013-present.

9. Church Membership and Significant Church Community Service

Church of the Resurrection, member 2007-present.

Involvement in the Men's Bible study (weekly), prayer cell (biweekly), small group (biweekly), Welcome Team (monthly), Worship team (pianist and oboist for special services).