Christopher J. Ryzowicz

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*indicates those publications, awards, or presentations that were selected through a formal referee or competitive process

Research Interests

Mathematical biology, nonlinear dynamics, gene regulation, delayed positive feedback systems, homeostatic systems.

Education

Present — **Florida State University (FSU)** – Tallahassee, Florida
Graduate student pursuing PhD. in Mathematics (Area of study: Biomathematics)
Advisor: Bhargav Karamched, PhD.

May 2024 — **Florida State University (FSU)** – Tallahassee, Florida
M.S in Mathematics (Area of study: Biomathematics)
Advisor/Director: Richard Bertram, PhD.

May 2022 — **New College of Florida (NCF): The Honors College of Florida** – Sarasota, Florida
B.A. in Applied Mathematics with secondary concentration in Statistics
Undergraduate Thesis: Dynamics of protein synthesis with autoregulation: A computational biology approach. Undergraduate thesis link
Advisor: Necmettin Yildirim, PhD.

Research Experience

2024 – Present — **Dynamic homeostasis in relaxation and bursting oscillations**
Mentors: Drs. Bhargav Karamched and Richard Bertram (Florida State University).
This research focuses on analyzing relaxation oscillations as a mechanism to model homeostatic systems. In addition, we explore how the corresponding models are affected by noise in the input stimulus.

2023 – Present — **Stochasticity and delays in positive feedback systems**
Mentors: Drs. Bhargav Karamched and Richard Bertram (Florida State University).
This research focuses on analyzing delay differential equation models of positive feedback with constant delay and investigating their ability to produce complex dynamics, such as oscillations. In addition, we analyze how the system processes intrinsic and extrinsic noise.

2021 – 2023 **Differential roles of negative autoregulations in protein synthesis**
Mentor: Prof. Necmettin Yildirim (New College of Florida).
This research focuses on regulation and control of protein synthesis dynamics by transcriptional and translational negative autoregulations. It investigates their capacity for producing complex dynamics such as oscillation, as well as how they process noise.

2021 – 2022 **Ciguatera fish poisoning in Florida** (Florida Institute of Technology)
Mentors: Prof. Nezamoddin-Kachouie, Prof. Robert van Woesik, Prof. Michael Splitt.
This preliminary research focused on data collection/wrangling of ciguatera fish poisoning cases in the state of Florida. In addition, statistical modeling via many regression types were explored to determine the best predictive model based on climate/environmental factors affecting southern Florida.

2020 – 2021 **Stochasicity and noise regulation in enzyme kinetics with inhibitors**
Mentor: Prof. Necmettin Yildirim (New College of Florida).
This research primarily focused on how stochasicity and noise is processed in enzymatic reactions with competitive, noncompetitive and mixed inhibitions.

2019 – 2020 **Cellular signaling and signal adaption: A systems biology approach**
Mentor: Prof. Necmettin Yildirim (New College of Florida).
This research focused on deterministic and stochastic aspects of two well-known signal adaptation mechanisms, namely negative feedback and incoherent feedforward loops, in systems biology. It investigates their capacity for producing complex dynamics such as oscillation and multiple steady states, as well as how they process intrinsic noise and noisy input signals.

Publications and Papers

*1. **C.J. Ryzowicz**, R. Bertram, and B.R. Karamched. Dynamic homeostasis in relaxation and bursting oscillations. *SIAM Journal on Life Sciences*. Accepted. (2025) Preprint Link

*2. D. Breininger, **C.J. Ryzowicz**, M. Goldberger, M. Splitt, R. van Woesik, and N. Kachouie. Ciguatera poisoning trends in Florida using a predictive hybrid model. *Regional Studies in Marine Science*, 104514. (2025) Journal Link

*3. **C.J. Ryzowicz**, R. Bertram, and B.R. Karamched. Oscillations in delayed positive feedback systems. *Physical Chemistry Chemical physics (PCCP)*, 26, 24861-24869. (2024) Journal Link

*4. **C.J. Ryzowicz** and N. Yildirim. Differential roles of transcriptional and translational negative autoregulations in protein dynamics. *Molecular Omics*, 19, 60 - 71. (2023) Journal Link.

*5. **C.J. Ryzowicz**, M. Goldberger, D. Breininger, M. Splitt, R. van Woesik, and N. Kachouie. Modeling ciguatera fish poisoning cases using climate and environmental factors in Florida. In *JSM proceedings*, Statistical Modeling Section. Alexandria, VA: American Statistical Association. (2022)

Honors and Scholarships

*2025	Dean's award for doctoral excellence ($3,000 annually for 3 years from Granville L. Larimore Endowment for Excellence in Arts and Science).
*2025	Tam Family award for excellence in graduate student research ($1,000 travel reward from Dr. Christopher Tam).
*Spring 2024	First place: FSU DeWitt Sumners Flash Talk Competition ($250 award).
*Summer 2021	Research Experience for undergraduates (REU) on Statistical Modeling with Applications in Geoscience (SMAG) funded by NSF at Florida Institute of Technology (SMAG REU Website).
*Summer 2020	Research Experience for undergraduates (REU) on Preparing Radio Engineers for Communication, Imaging, and Sensing at Florida International University (**Canceled** due to Covid-19).
2018-2022	Bright futures academic scholarship covering full tuition for 4 years. This is a state funded merit-based scholarship awarded to Florida students with strong academic performance and community service.
2018-2022	Academic scholarship funded by New College of Florida and awarded to students based on good-standing academic records. (*$1000 per semester*).
*2018-2019	Mu Alpha Theta honorary scholarship (*$800 two semesters*) (*MA*Θ Honor Society). This is a competitive scholarship awarded to only a few students every year.
*2018	Mathematics Student of the Year award (J.W. Mitchell High School).
2018	United States Bowling Congress (USBC) scholarship (*$1,300*). This is a scholarship given annually to bowling students based on tournament scores, placings, and average performance throughout the bowling season.

Talks, Conferences, and Workshops

1. **C.J. Ryzowicz** and the Blue Team (2025), Revolutionary Treatment, *Integrated Mathematical Oncology (IMO) workshop at Moffitt Cancer Center*, November 2nd-7th, Tampa, Fl.

2. **C.J. Ryzowicz**, R. Bertram, B.R. Karamched (2025), Dynamic homeostasis in relaxation and bursting oscillations, *NITMB Convergence Conference*, August 11-14th, Chicago, IL.

3. **C.J. Ryzowicz**, R. Bertram, B.R. Karamched (2025), Oscillations in delayed positive feedback systems, *SIAM Conference on Applications in Dynamical Systems (DS25) mini-symposium*, May 11-15th, Denver, Co.

4. **C.J. Ryzowicz**, R. Bertram, B.R. Karamched (2024), Oscillations in delayed positive feedback systems, *New College of Florida Math seminar*, March 12th, New College of Florida, Sarasota, Fl.

5. **C.J. Ryzowicz** (2022), Modeling ciguatera fish poisoning using climate and environmental factors in Florida, *Joint Statistical Meetings (JSM)*, August 10th, Walter Washington Convention Center, Washington D.C

6. **C.J. Ryzowicz** (2022), Deterministic analysis of protein synthesis with autoregulation, *Seminar Series in Mathematics*, March 8th, New College of Florida. Sarasota, Fl.

7. M. Goldberger, **C.J. Ryzowicz** (2021), Statistical modeling of ciguatera fish poisoning in Florida, *Council on Undergraduate Research National REU Symposium*, October 25th, Virtual on Zoom

8. M. Goldberger, **C.J. Ryzowicz** (2021), Ciguatera fish poisoning in Florida: A statistical analysis, *Florida Institute of Technology REU Seminar*, July 10th, Florida Institute of Technology, Melbourne FL.

9. **C.J. Ryzowicz** (2021), Higher dimensional darts, *Seminar Series in Mathematics*, April 21st, New College of Florida, Sarasota FL.

10. **C.J. Ryzowicz** (2021), Adaptive systems in biology: A comparative study, *Division of Natural Sciences Seminar Series*, March 16th, New College of Florida, Sarasota FL.

11. **C.J. Ryzowicz** (2020), Dynamics of cellular signal adaptation: A comparative study, *Mathematics Continued Conference*, November 14th, University of Connecticut, Virtual on Zoom

12. **C.J. Ryzowicz** (2020), Cellular signal adaptation in biology, *Seminar Series in Mathematics*, March 24th, New College of Florida, Sarasota FL.

13. **C.J. Ryzowicz** (2019), Solution to the Basel problem, *Seminar Series in Mathematics*, March 19th, New College of Florida, Sarasota FL.

14. **C.J. Ryzowicz** (2018), Calculating a fall through the earth, *Seminar Series in Mathematics*, October 16th, New College of Florida, Sarasota FL.

Research Assistantship

Spring 2024,2025 Summer 2024 Fall 2024 — **Graduate research assistant (PI: Bhargav Karamched)**
Carried out research on "Delays and stochasticity in positive feedback systems" and "Dynamic homeostasis in relaxation and bursting oscillations" to contribute to my thesis.

Teaching Assistantship

Spring 2026 — **Instructor of Record, MAC2311: Calculus 1 with Analytic Geometry (FSU)**
Responsibilities include giving lectures, proctoring quizzes and exams, holding weekly office hours, and running recitation sections.

Fall 2025 — **Recitation instructor, MAC2311: Calculus 1 with Analytic Geometry (FSU)**
Responsibilities include assisting in lectures, proctoring quizzes, holding weekly office hours, and running recitation sections.

Fall 2023 — **Graduate teaching assistant, MGF 1107: Practical Finite Mathematics (FSU)**
Responsibilities include providing feedback on all homework assignments and holding weekly office hours, and run multiple lab sections for students.

Spring 2023 — **Graduate TA/grader, MAP2302: Ordinary Differential Equations (FSU)**
Responsibilities include grading on all homework/quiz assignments and holding weekly office hours.

Fall 2022, 2023 **Graduate teaching assistant, MGF 1106: Liberal Arts Math I (FSU)**
Responsibilities include providing feedback on all homework assignments and holding weekly office hours, and run multiple lab sections for students.

Fall 2022 **Graduate teaching assistant, MAC 1114: Analytic Trigonometry (FSU)**
Responsibilities include providing feedback on all homework assignments and holding weekly office hours, and run multiple lab sections for students.

Spring 2022 **Undergraduate teaching assistant, MATH 2320: Linear Algebra (New College of Florida)**
Responsibilities include providing feedback on all homework assignments and holding weekly study sessions for students.

Spring 2022 **Undergraduate teaching assistant, MATH 3100: Numerical Methods (New College of Florida)**
Responsibilities include providing feedback on all homework assignments, holding weekly office hours for students, and assisting in MATLAB coding assignments.

Fall 2020, 2021 **Undergraduate teaching assistant, MATH 2400: Calculus I (New College of Florida)**
Responsibilities include providing feedback on selected homework assignments, holding weekly office hours for students, and attending class to assist in lectures.

Spring 2021 **Undergraduate teaching assistant, MATH 3250: Calculus II (New College of Florida)**
Responsibilities included providing feedback on selected homework assignments, holding weekly study sessions for students, organizing/running weekly workshops, and attending class to assist in lectures.

Spring 2021 **Undergraduate teaching assistant, MATH 4400: Mathematical Modeling (New College of Florida)**
Responsibilities included providing feedback homework assignments, implementing weekly office hours for additional help, and assisting in weekly workshops.

Employment

2024 - Present **Graduate research Assistant (FSU)** – Tallahassee, Florida
Work includes: Carry out research, attend research meetings.

2022 - Present **Graduate teaching Assistant (FSU)** – Tallahassee, Florida
Work includes: Holding office hours, run lab sections, assist in lecture, grade assignments, and proctor tests.

2018 - present **Trinity Auto Worx (Auto repair technician)** – Odessa, Florida
Work includes: Diagnose and repair, preventative maintenance, suspension/alignments, electrical systems, brake repair, order parts, inventory checks, and rebuild engines.

2016-2018 **Christo's Family Restaurant (bus boy)** – Trinity, Florida
Responsibilities included: Work with wait staff to handle customer needs, refill beverages, greet guests, remove dishes and trash from table upon customer departure, sanitize and clean table and chairs, swept area when needed, completed end of shift cleaning duties to maximize dining area cleanliness.

Mentorship and Service

*2024 – present **Secretary of SIAM at FSU**
Responsibilities include observation over every meeting, sending emails of upcoming events and meetings, and yearly report submission to SIAM.

2018 – present **Trinity Auto Worx**
Responsibilities include observation over new employees, teaching new employees how to properly/safely use equipment, open/close shop space daily, and clean shop areas.

2016 – 2017 **Regency Park Library (Volunteer Library Assistant)**
Volunteer tasks include restocking books, taking inventory, cleaning study rooms, preparing for events, and front desk check outs.

2015 – 2017 **Pasco Police Athletic League (Volunteer)**
Responsible for field preparation, front gate entry, equipment management, and minor coaching duties.

Memberships

2023-Present **Society of Mathematical Biology (SMB)**

2023-Present **Society of Industrial and Applied mathematics (SIAM)**

2022-Present **American Mathematical Society (AMS)**

Technical Skills

Programming languages
Proficient in: Statistical Programming Language R, MATLAB, Maple
Familiar with: Python

Software
XPPAUT, LaTeX, R Markdown, Microsoft Word, Excel, PowerPoint, Mac OS, Windows OS

Languages
English (fluent)

Other Interests

Some non-academic hobbies include kayaking, cycling, football, hockey, collecting, reading (non-fiction,science fiction,mystery), and working on cars.