Fabio A. Sanchez, Ph.D.

Contact Information

email: fabio.sanchez@ucr.ac.cr
celular: +1506-6157-1976

Education

Ph.D., Department of Biological Statistics and Computational Biology
Cornell University, January 2007
Sloan Scholar

Thesis Title: *Theoretical Studies in Epidemiology and Social Dynamics*
Adviser: Dr. Carlos Castillo-Chavez

Universidad Metropolitana, Cupey, Puerto Rico
B.S. in Computer Science, June 2001
Minor: Mathematics, June 2001

Professional Experience

Universidad de Costa Rica
Associate Professor
San Jose, Costa Rica
August 2019 – present
Teaching duties. Conduct research in applied mathematics.

Universidad de Costa Rica
Director, Applied Mathematics Department
San Jose, Costa Rica
March 2019 – **February** 2023
Oversee the management of applied math courses.

Universidad de Costa Rica
Adjunct Professor
San Jose, Costa Rica
March 2019 – **August** 2019
Teaching duties. Conduct research in applied mathematics.

Universidad de Costa Rica
Invited Professor
San Jose, Costa Rica
August 2017 – **August** 2018
Teaching duties. Conduct research in applied mathematics.

Universidad de Costa Rica
Visiting Professor
San Jose, Costa Rica
August 2014 – **August**2017
Teaching duties. Conduct research in applied mathematics.

Colegio Científico Costarrisence (San Pedro)
Mathematics Teacher
San Pedro, Costa Rica.
Agosto 2016 – **Diciembre** 2016
Teach precalculus and a special topics course.

The European School
Math, Science, & Computer Teacher
Heredia, Costa Rica
July 2012 – **December** 2014
High School *math, science, computer* teacher.

Arizona State University
Adjunct Faculty
Tempe, Arizona
July 2012 – **June** 2015
Conduct research in applied mathematics.

Arizona State University
Assistant Research Professor
Tempe, Arizona
October 2010 – **July** 2012
Conduct research in applied mathematics.

Universidad Metropolitana
Summer Director/Faculty (Mathematical Theoretical Biology Institute (MTBI) Puerto Rico)
Cupey, Puerto Rico
June 2 2010 – **July 2** 2010
The program provides research experience for undergraduate students in Applied Mathematics and related fields. The director must manage students (undergraduates and graduates) and assign duties to those involved in the program. The director is responsible for organizing the student lecture schedule, visitors, and any activity (social or academic) related to the program. During the second part of the program, the director must advise multiple groups on their projects and is responsible for the quality of the final report. This program is based on the program based at Arizona State University (MTBI).

Arizona State University
Adjunct Faculty
Tempe, Arizona
February 2007 – **June** 2015
Conduct research in applied mathematics.

American Express
Manager, Credit Strategy
Phoenix, Arizona
October 2006 – **September** 2009
Develop, implement, and validate credit strategies: credit case setups, line reduction selection, Lending on Charge suspension, and unsuspension. In addition, charge purchasing capacity assignment to drive the profitable growth of the Charge Card, Lending, and Lending on Charge businesses in Small Business markets. Focus on identifying key business opportunities, developing innovative modeling/rule-based solutions, providing programming support, and making strategic recommendations to drive profitable spending and improve the customer experience for customers of OPEN (small and medium businesses).

Arizona State University
Instructor of Mathematics
Tempe, Arizona
August 2005 – **July** 2006
Classes: Multivariable Calculus (Calculus III) and Calculus for Business.

Arizona State University
MTBI Summer Director
Tempe, Arizona
June 6 – July 27, 2006
The Mathematical and Theoretical Biology Institute was established in 1996 by Prof. Carlos Castillo-Chavez at Cornell University. The program provides research experience for undergraduate students in Applied Mathematics and related fields. The director must manage students (undergraduates and graduates) and assign duties to those involved in the program. The director is responsible for organizing the student lecture

schedules, visitors, and any activity (social or academic) related to the program. During the second part of the program, the director is required to advise multiple groups in their projects and is responsible for the quality of the final report.

Directed undergraduate projects in applied mathematics:
"The Effects of Myeloid Cells on Tumor-Immune System Interaction in Different Time Scales" D. Chowell, I. Kareva, R. Torre, A. Mubayi, Sanchez F, and F. Berezovskaya

"Mathematical Modeling of the Sex Worker Industry as a Supply and Demand System" L. Davidoff, K. Sutton, G. Toutain, C. Kribs-Zaleta and Sanchez F

"Mathematical Modeling of Cigarette Smoking among Adolescents as an Infectious Disease" L.D. Montejo, L. Gordon, P. Reitsma, O. Colón-Rentas, Sanchez F and B. Song

Los Alamos National Laboratory
MTBI Assistant Coordinator
Los Alamos, NM.
Summer 2004 – **Summer** 2005
Duties involved organizing class schedules and computer labs. Developed and taught xppaut (dynamical systems software) computer labs. Directed undergraduate projects.

Prevention Research Center
Ph.D. Candidate
Berkeley, California
May 2004
Served as a consultant to the Prevention Research Center. Proposed the use of mathematical models to study drinking dynamics.

Los Alamos National Laboratory
Graduate Research Assistant
Los Alamos, New Mexico
January 2003 – **January** 2004
Collaborated with lab scientists from different fields on topics related to mathematical biology.

Los Alamos National Laboratory
Conference co-organizer
Los Alamos, New Mexico
June 2003
Co-organizer of the conference: *Computational and Mathematical Approaches to Homeland Security, Public Health Policy and Control: Challenges Posed by Emerging and Reemerging Diseases.*

Teaching Experience

Universidad de Costa Rica, Escuela de Matemática - August 2013 **- present**

Universidad de Costa Rica - Ciclo I (2025)
MA0151 - Clculo para Ciencias Actuariales

Colegio Científico Costarrisence (San Pedro)
MA0125 - Precálculo (Décimo)
Lgica - undécimo

Universidad de Costa Rica - Ciclo II (2024)
MA0151 - Clculo para Ciencias Actuariales
MA0406 - Investigacin de Operaciones I
PF1364 - Modelos Matemáticos y sus Aplicaciones II

Colegio Científico Costarrisence (San Pedro)
MA1001 - Cálculo (Undécimo)

Álgebra Lineal - Décimo

Universidad de Costa Rica - Ciclo I (2024)
PF1354 - Modelos Matemáticos y sus Aplicaciones

Colegio Científico Costarrisence (San Pedro)
MA1001 - Cálculo (Undécimo)
Álgebra Lineal - Décimo

Universidad de Costa Rica - Ciclo II (2023)
PF1301 - Probabilidad Aplicada

Colegio Científico Costarrisence (San Pedro)
MA0125 - Precálculo (Décimo)
Aplicaciones de Modelos Matemáticos en Biología - Undécimo

Universidad de Costa Rica - Ciclo I (2023)

MA0602 - Matemáticas en las Ciencias

SP1312 - Ecuaciones Diferenciales II

PF1364 - Aplicaciones de Sistemas Dinámicos

Colegio Científico Costarrisence (San Pedro)
MA0125 - Precálculo (Décimo)
Aplicaciones de Modelos Matemáticos en Biología - Undécimo

Universidad de Costa Rica - Ciclo II (2022)
PF1354 - Modelos Matemáticos y sus Aplicaciones

Universidad de Costa Rica - Ciclo I (2022)
MA0800 - Seminario de Matemática

Universidad de Costa Rica - Ciclo II (2021)
MA0550 - Ecuaciones Diferenciales para Enseñanza

Universidad de Costa Rica - Ciclo I (2021)
MA0602 - Matemáticas en las Ciencias

Universidad de Costa Rica - Ciclo II (2020)
MA0550 - Ecuaciones Diferenciales para Enseñanza

Universidad de Costa Rica - Ciclo I (2020)
PF1354 - Modelos Matemáticos y sus Aplicaciones

Universidad de Costa Rica - Ciclo I (2020)
MA0602 - Matemáticas en las Ciencias

Universidad de Costa Rica - Ciclo II (2019)
MA0550 - Ecuaciones Diferenciales para Enseñanza

Universidad de Costa Rica - Ciclo I (2019)
MA1005 - Ecuaciones Diferenciales para Ingeniería

Universidad de Costa Rica - Ciclo II (2018)
MA0550 - Ecuaciones Diferenciales para Enseñanza

Universidad de Costa Rica - Ciclo I (2018)
MA1005 - Ecuaciones Diferenciales para Ingeniería (Coordinador)

Universidad de Costa Rica - Ciclo II (2017)
MA2210 - Ecuaciones Diferenciales Aplicadas (Grupo 3) (Coordinador)

Universidad de Costa Rica - Ciclo I (2017)
MA2210 - Ecuaciones Diferenciales Aplicadas (Grupo 5) (Coordinador)
MA2210 - Ecuaciones Diferenciales Aplicadas (Grupo 6)

Universidad de Costa Rica - Ciclo II (2016)
MA2210 - Ecuaciones Diferenciales Aplicadas (Grupo 2) (Coordinador)

Colegio Científico Costarrisence (San Pedro)
MA0125 - Pre-cálculo (Décimo)
Modelación - Undécimo

Universidad de Costa Rica - Ciclo I (2016)
MA2210 - Ecuaciones Diferenciales Aplicadas (Grupo 1) (Coordinador)
MA2210 - Ecuaciones Diferenciales Aplicadas (Grupo 2)

Universidad de Costa Rica - Ciclo II (2015)
MA1006 - Análisis Numérico (Grupo 1) (Coordinador)

Universidad de Costa Rica - Ciclo I (2015)
MA0292 - Algebra Lineal (Grupo 3)
MA1006 - Análisis Numérico (Grupo 2) (Coordinador)

Universidad de Costa Rica - Ciclo II (2014)
MA1004 - Algebra Lineal (Grupo 15)
MA1006 - Análisis Numérico (Grupo 2)

Universidad de Costa Rica - Ciclo I (2014)
MA1004 - Algebra Lineal (Grupo 3)
MA1004 - Algebra Lineal (Grupo 5)

Universidad de Costa Rica - Ciclo II (2013)
MA1001 - Cálculo I (Grupo 29)

European School, Heredia, Costa Rica - July 2012 **- December** 2013

Arizona State University - Fall (2012)
AML 493 - Honors Directed Study

Arizona State University - Fall (2012)
AML 294 - Special Topics: From Cells to Societies

Course content
What do cells, ant colonies, cities, and human societies share? Their behavior can be described with similar concepts. This course introduces these concepts and shows how to apply them to various systems and problems. These concepts apply to what we call "complex adaptive systems", which describe the micro-behavior of many interacting units that lead to macro-level patterns. An example is an ant colony that behaves similarly to a single organized system, while ants respond individually to local information. Introducing concepts include emergence, feedback, path dependency, scale, networks, adaptation, resilience, and stigmergy. Applying these concepts to nervous systems, social insects, ecosystems, and cities enables us to understand better what makes them sustainable and adaptable. It also helps us explain the role of diversity, what stimulates innovation, and why people cooperate.

Arizona State University - MTBI Summer Program ($2002 - 2009, 2011, 2014$)
Topics included dynamical systems, backward bifurcations, epidemic models, and social

dynamics.

The Mathematical and Theoretical Biology Institute supports student development through educational, research, and mentorship activities from the undergraduate to the postdoctoral level. Its programs include intensive multiple-summer research training institutes, long-term support for its alumni, and continuous research opportunities for undergraduate, graduate, and postdoctoral students.

Arizona State University - Spring (2012)
AML 492 - Honors Directed Study

Arizona State University - Fall (2011)
AML 100 - Introduction to Applied Mathematics in the Life & Social Sciences
AML 610 - Topics in Mathematical Ecology and Epidemiology

Arizona State University - Math-Science Honors Program - Summer (2011)
AML 100 - Introduction to Applied Mathematics in the Life & Social Sciences

The Joaquin Bustoz Math-Science Honors Program is an intense academic program that provides motivated students an outstanding opportunity to begin university mathematics and science studies before graduating high school. The program is designed to provide a successful university experience for underrepresented mathematics and science students and enhance their academic success prospects.

Universidad Metropolitana - MTBI Puerto Rico (June 2, 2010 – July 2, 2010)
Topics included dynamical systems, backward bifurcations, epidemic models, and social dynamics.

Arizona State University - Math-Science Honors Program - Summer (2010)
AML 100 - Introduction to Applied Mathematics in the Life & Social Sciences

The Joaquin Bustoz Math-Science Honors Program is an intensive academic program that provides motivated students with an outstanding opportunity to begin university-level mathematics and science studies before graduating from high school. The program is designed to provide a successful university experience for underrepresented students in mathematics and science, and to enhance their academic success prospects.

Research Mentorship

Universidad de Costa Rica
José Mario Castro - Undergraduate student

Universidad de Costa Rica
Brenda Murillo - Master's student
Expected graduation date: TBA.

Universidad de Costa Rica
María Gabriela Sánchez - Master's student
Expected graduation date: September 2025.

Universidad de Costa Rica
Cinthya Arce - Master's student
Expected graduation date: September 2025.

Universidad de Costa Rica (2023)
Arturo Vega - Master's student
Expected graduation date: September 2025.

Universidad de Costa Rica (2023)
Jimmy Calvo-Monge - Master's student

Graduation date: September 13, 2023.
Thesis Title: *Development and analysis of human adaptive behavior in a model with non-linear relapse*

Thesis Publication
Calvo-Monge J, Sanchez F, Calvo JG, and Mena D. (2023) *A nonlinear relapse model with disaggregated contact rates: analysis of a forward-backward bifurcation.* Infectious Disease Modelling **8**(3). https://doi.org/10.1016/j.idm.2023.06.004

Universidad de Costa Rica (2023)
John Orozco - Master's student
Graduation date: March 14, 2023.
Thesis Title: *Asociación entre la introducción de la vacuna contra la COVID-19 y el Índice Mensual de Actividad Económica en Costa Rica*

Universidad de Costa Rica (2023)
Yury E. García, Ph.D. - Postdoc
Period: January 2020 - December 2020.

Pubications
García YE, Chou-Chen S-W, Barboza LA, Daza-Torres ML, Montesinos-López JC, Vásquez P, Calvo JG, Nuño M, Sanchez F. (2023)*Common patterns between dengue cases, climate, and local environmental variables in Costa Rica: A Wavelet Approach.* PLoS Global Public Health **3**(10): e0002417. https://doi.org/10.1371/journal.pgph.0002417

Barboza LA, Chou S-W, Vásquez P, **García YE**, Calvo JG, Hidalgo HG, and Sanchez F. (2023) *Assessing dengue fever risk in Costa Rica by using climate variables and machine learning techniques.* PLoS Neglected Tropical Diseases **17**(1), e0011047. https://doi.org/10.1371/journal.pntd.0011047

Calvo JG, Sanchez F, Barboza LA, **García YE**, and Vásquez P. (2022) *A Multilayer Network Model implementation for Covid-19.* Mathematical Biosciences and Engineering **20**(1). https://doi.org/10.3934/mbe.2023024

Sanchez F, Calvo JG, **García YE**, Barboza LA, Vásquez P, Mery G, Pérez MD, and Rivas T. (2022) *A multilayer network model of Covid-19: implications in public health policy in Costa Rica.* Epidemics **39**(100577). https://doi.org/10.1016/j.epidem.2022.100577

Sanchez F, Barboza LA, Vásquez P, **García YE**, Calvo JG, Chou S-W, and Mery G. (2022) *Mathematical and Statistical models as tools for the control of mosquito-borne diseases: The experience of Costa Rica.* Rev Panam Salud Publica **46**: e113. https://doi.org/10.26633/RPSP.2022.113

García YE, Mery G, Vásquez P, Calvo JG, Barboza LA, Rivas T, and Sanchez F. (2022) *Projecting the Impact of Covid-19 Variants and Vaccination Strategies in Disease Transmission using a Multilayer Network Model in Costa Rica.* Scientific Reports **12**(2279). https://doi.org/10.1038/s41598-022-06236-1

Barboza LA, Vásquez P, Mery G, Sanchez F, **García YE**, Calvo JG, Rivas T, Pérez MD, and Salas D. (2021) *The Role of Mobility and Sanitary Measures on the Delay of Community Transmission of COVID-19 in Costa Rica.* Epidemologia **2**(3), 294-304. https://doi.org/10.3390/epidemiologia2030022

Universidad de Costa Rica (2023)

Paola Vásquez, M.D. - Master's student
Graduation date: September 25, 2020.
Thesis Title: *Uso del aprendizaje automatizado y de variables climáticas como herramienta para la predicción del riesgo de dengue en Costa Rica, periodo 2007-2017*

Thesis Publication
Vásquez P, Loría A, Sanchez F, and Barboza L. (2019) *Climate-driven statistical models as effective predictors of local dengue incidence in Costa Rica: A Generalized Additive Model and Random Forest approach.* Revista de matemática: Teoría y Aplicaciones, Special issue - *Mathematical Modeling: A New Frontier* **27**(1), 1-21. https://doi.org/10.15517/RMTA.V27I1.39931

Other Publications
Barboza LA, Chou S-W, **Vásquez P**, García YE, Calvo JG, Hidalgo HG, and Sanchez F. (2023) *Assessing dengue fever risk in Costa Rica by using climate variables and machine learning techniques.* PLoS Neglected Tropical Diseases **17**(1): e0011047. https://doi.org/10.1371/journal.pntd.0011047

Calvo JG, Sanchez F, Barboza L, García YE, and **Vásquez P**. (2022) *A Multilayer Network Model implementation for Covid-19.* Mathematical Biosciences and Engineering **20**(1). https://doi.org/10.3934/mbe.2023024

Sanchez F, Calvo JG, García YE, Barboza LA, **Vásquez P**, Mery G, Pérez MD, and Rivas T. (2022) *A multilayer network model of Covid-19: implications in public health policy in Costa Rica.* Epidemics **39**(100577). https://doi.org/10.1016/j.epidem.2022.100577

Sanchez F, Barboza LA, **Vásquez P**, García YE, Calvo JG, Chou S-W, and Mery G. (2022) *Mathematical and Statistical models as tools for the control of mosquito-borne diseases: The experience of Costa Rica.* Rev Panam Salud Publica **46**: e113. https://doi.org/10.26633/RPSP.2022.113

García YE, Mery G, **Vásquez P**, Calvo JG, Barboza LA, Rivas T, and Sanchez F. (2022) *Projecting the Impact of Covid-19 Variants and Vaccination Strategies in Disease Transmission using a Multilayer Network Model in Costa Rica.* Scientific Reports, **12**(2279). https://doi.org/10.1038/s41598-022-06236-1

Barboza LA, **Vásquez P**, Mery G, Sanchez F, García YE, Calvo JG, Rivas T, Pérez MD, and D. Salas. (2021) *The Role of Mobility and Sanitary Measures on the Delay of Community Transmission of COVID-19 in Costa Rica.* Epidemologia **2**(3), 294-304. https://doi.org/10.3390/epidemiologia2030022

Sanchez F, Arroyo-Esquivel J, and **Vásquez P**. (2019) *Hospitalization in the transmission of dengue dynamics: The impact on public health policies.* Revista de matemática: Teoría y Aplicaciones, Special issue - *Mathematical Modeling: A New Frontier* **27**(1), 241-266. https://doi.org/10.15517/RMTA.V27I1.39977

Sanchez F, Barboza L, and **Vásquez P**. (2019) *Parameter estimates of the 2016-2017 Zika outbreak in Costa Rica: An Approximate Bayesian Computation (ABC) Approach.* Mathematical Biosciences and Engineering **16**(4), 2738-2755. https://doi.org/10.3934/mbe.2019136

Universidad de Costa Rica (2017 – 2018)
Jorge Arroyo, Ph.D. - undergraduate research mentor

Publications

Sanchez F, **Arroyo-Esquivel J**, and Vásquez P. (2019) *Hospitalization in the transmis-*

sion of dengue dynamics: The impact on public health policies. Revista de matemática: Teoría y Aplicaciones, Special issue - *Mathematical Modeling: A New Frontier*, **27**(1), 241-266. https://doi.org/10.15517/RMTA.V27I1.39977

Arroyo J, Sanchez F, and Barboza L. (2019) *Infection model for analyzing biological control of coffee rust using bacterial anti-fungal compounds.* Mathematical Biosciences **307**, 13-24. https://doi.org/10.1016/j.mbs.2018.10.009

Arizona State University - MTBI Summer Program (2014)
Directed an undergraduate project in the applied mathematics field. *The effect of rural/urban movement on Dengue transmission dynamics*
Advisor: Dr. Fabio Sanchez

School of Human Evolution & Social Change Undergraduate Research Symposium, April 2012 Poster:"Analyzing Public Good Games and Group Cooperation in Academia using Agent-Based Computer Simulations", by Erik Thunberg and Mary Hayes
Mentor: Fabio Sanchez

ASU-UCR-Ministry of Health Collaborative Dengue Fever Pilot Project-August, 2011

Overview
The Universidad de Costa Rica (UCR) - Arizona State University (ASU) Collaborative Dengue Fever Project is a data-gathering project with the primary objective of starting the dialogue between Arizona State University, Universidad de Costa Rica, and the Ministry of Health of Costa Rica. This pilot project may lead to a possible future grant proposal from a United States agency in two or three years if the collaboration between all entities continues long-term.

The primary goal was to collect preliminary data. A possible outcome is writing a collaborative paper with all involved in this project as coauthors (ASU, UCR, and Ministry of Health officials).

Our project consisted of collecting mosquito and larvae samples in Buenos Aires and testing them for the presence of dengue in the Molecular Biology Lab at the Universidad de Costa Rica (UCR). Dr. Jose Bonilla (Director), Ivannia Atmetlla, Dr. Sandra Silva, and Dr. Xinia Barrantes provided the lab space and valuable staff support during our stay at UCR. This specificity prevalence study will allow us to determine the proportion of infected mosquitoes in a specific area and evaluate the possible ecological and environmental variables that could affect the prevalence of dengue. Also, individual mosquito specimens were tested to check for genetic variability between *Aedes aegypti* from the different sectors of the Buenos Aires area.

Arizona State University - MTBI Summer Program (2007-2009, 2011)
Directed an undergraduate project in applied mathematics.

Los Alamos National Laboratory MTBI Summer Program (2003 – 2005)
Directed an undergraduate project in applied mathematics.

Cornell University MTBI Summer Program (2000 – 2002)
Directed an undergraduate project in applied mathematics.

University of Colorado at Boulder SMART Program (1999)
Research: Programmed a GUI in Tcl/Tk (UNIX machine) for a large program that was used to measure river sedimentation (2D SEDFLUX)
Advisor: Dr. James Syvitski

Publications

Calvo-Monge J, Espinoza B, **Sanchez F**, Arroyo-Esquivel J. (2025) *Interplay between Foraging Choices and Population Growth Dynamics.* PLOS One *Accepted.*

Soto-Rojas C, Garita C, Abdalah M, Calvo JG, **Sanchez F**, Meneses E. (2024) *Anlisis preliminar de la correlacin de variables socioeconmicas con modelado geoespacial en la epidemia de dengue en Costa Rica.* Revista Tecnologa En Marcha **37**(7). https://doi.org/10.18845/tm.v37i7.7292

Calvo-Monge J, Arroyo-Esquivel J, Gehman A, **Sanchez F**. (2024) *Source-sink dynamics in a two-patch SI epidemic model with life stages and no recovery from infection.* Bulletin of Mathematical Biology **86**(102). https://doi.org/10.1007/s11538-024-01328-7

S.-W, Chou-Chen, Barboza LA, Vásquez P, García YE, Calvo JG, Hidalgo HG, and **Sanchez F**. (2023) *Bayesian spatio-temporal model with INLA for dengue fever risk prediction in Costa Rica.* Environmental and Ecological Statistics **30**, 687713. https://doi.org/10.1007/s10651-023-00580-9

García YE, Chou-Chen S-W, Barboza LA, Daza-Torres ML, Montesinos-López JC, Vásquez P, Calvo JG, Nuño M, and **Sanchez F**. (2023) *Common patterns between dengue cases, climate, and local environmental variables in Costa Rica: A Wavelet Approach.* PLoS Global Public Health **3**(10): e0002417. https://doi.org/10.1371/journal.pgph.0002417

Calvo-Monge J, **Sanchez F**, Calvo JG, and Mena D. (2023) *A nonlinear relapse model with disaggregated contact rates: analysis of a forward-backward bifurcation.* Infectious Disease Modelling **8**(3). https://doi.org/10.1016/j.idm.2023.06.004

Sanchez F, Arroyo J, and Calvo JG. (2023) *A mathematical model with nonlinear relapse: conditions for a forward-backward bifurcation.* Mathematical Biosciences and Engineering **17**(1). https://doi.org/10.1080/17513758.2023.2192238

Barboza LA, Chou S-W, Vásquez P, García YE, Calvo JG, Hidalgo HG, and **Sanchez F**. (2023) *Assessing dengue fever risk in Costa Rica by using climate variables and machine learning techniques.* PLoS Neglected Tropical Diseases **17**(1): e0011047. https://doi.org/10.1371/journal.pntd.0011047

Calvo JG, **Sanchez F**, Barboza L, García YE, and Vásquez P. (2022) *A Multilayer Network Model implementation for Covid-19.* Mathematical Biosciences and Engineering **20**(1). https://doi.org/10.3934/mbe.2023024

Sanchez F, Calvo JG, García YE, Barboza LA, Vásquez P, Mery G, Pérez MD, and Rivas T. (2022) *A multilayer network model of Covid-19: implications in public health policy in Costa Rica.* Epidemics **39**(100577). https://doi.org/10.1016/j.epidem.2022.100577

Sanchez F, Barboza LA, Vásquez P, García YE, Calvo JG, Chou S-W, and Mery G. (2022) *Mathematical and Statistical models as tools for the control of mosquito-borne diseases: The experience of Costa Rica.* Rev Panam Salud Publica **46**: e113. https://doi.org/10.26633/RPSP.2022.113

García YE, Mery G, Vásquez P, Calvo JG, Barboza LA, Rivas T, and **Sanchez F**. (2022) *Projecting the Impact of Covid-19 Variants and Vaccination Strategies in Disease Transmission using a Multilayer Network Model in Costa Rica.* Scientific Reports **12**(2279). https://doi.org/10.1038/s41598-022-06236-1

Montesinos-López JC, Daza-Torres ML, García YE, Barboza LA, **Sanchez F**, Schmidt AJ, Pollock BH, and Nuño M. (2021) *The Role of SARS-CoV-2 Testing on Hospitalizations in California.* Life **11**(1336). https://doi.org/10.3390/life11121336

Barboza LA, Vásquez P, Mery G, **Sanchez F**, García YE, Calvo JG, Rivas T, Pérez MD, and D. Salas. (2021) *The Role of Mobility and Sanitary Measures on the Delay of Community Transmission of COVID-19 in Costa Rica.* Epidemologia **2**(3), 294-304. https://doi.org/10.3390/epidemiologia2030022

Sanchez F and Calvo JG. (2019) *An Age-structured ODE Model for Dengue Transmission Dynamics and Control.* Revista de matemática: Teoría y Aplicaciones Special issue - *Mathematical Modeling: A New Frontier* **27**(1), 157-177. https://doi.org/10.15517/RMTA.V27I1.39966

Vásquez P, Loría A, **Sanchez F**, and Barboza L. (2019) *Climate-driven statistical models as effective predictors of local dengue incidence in Costa Rica: A Generalized Additive Model and Random Forest approach.* Revista de matemática: Teoría y Aplicaciones Special issue - *Mathematical Modeling: A New Frontier* **27**(1), 1-21. https://doi.org/10.15517/RMTA.V27I1.39931

Calvo JG, Hernández A, Porter M, and **Sanchez F**. (2019) *Two-patch model with nonlinear relapse.* Revista de matemática: Teoría y Aplicaciones, Special issue - *Mathematical Modeling: A New Frontier* **27**(1), 23-48. https://doi.org/10.15517/RMTA.V27I1.39946

Sanchez F, Arroyo-Esquivel J, and Vásquez P. (2019) *Hospitalization in the transmission of dengue dynamics: The impact on public health policies.* Revista de matemática: Teoría y Aplicaciones Special issue - *Mathematical Modeling: A New Frontier* **27**(1), 241-266. https://doi.org/10.15517/RMTA.V27I1.39977

Sanchez F, Calvo JG, Segura E, and Feng Z. (2019) *A partial differential equation model with age-structure and nonlinear recidivism: Conditions for a backward bifurcation and a general numerical implementation.* Computers and Applied Mathematics with Applications **78**(12), 3916-3930. https://doi.org/10.1016/j.camwa.2019.06.021

Sanchez F, Barboza L, and Vásquez P. (2019)*Parameter estimates of the 2016-2017 Zika outbreak in Costa Rica: An Approximate Bayesian Computation (ABC) Approach.* Mathematical Biosciences and Engineering **16**(4), 2738-2755. https://doi.org/10.3934/mbe.2019136

Sanchez F and Calvo JG. (2019) *The role of short-term immigration on disease dynamics: An SIR model with age-structure.* Revista de matemática: Teoría y Aplicaciones **26**(1), 139-159. https://doi.org/10.15517/RMTA.V26I1.36229

Arroyo J, **Sanchez F**, and Barboza L. (2019) *Infection model for analyzing biological control of coffee rust using bacterial anti-fungal compounds.* Mathematical Biosciences **307**, 13-24. https://doi.org/10.1016/j.mbs.2018.10.009

Sanchez F, Barboza L, Burton D, and Cintron A. (2018) *Comparative analysis of dengue versus chikungunya outbreaks in Costa Rica.* Ricerche di matematica **67**(1), 163-174. https://link.springer.com/article/10.1007/s11587-018-0362-3

Murillo D, Holechek S, Murillo A, **Sanchez F**, and Castillo-Chavez C. (2014) *Vertical Transmission in a Two-Strain Model of Dengue Fever.* Letters in Biomathematics **1**(2), 249-271. https://doi.org/10.30707/LiB1.2Murillo

Sanchez F, Murillo D, and Castillo-Chavez C. (2012) *Change in Host Behavior and its Impact on the Transmission Dynamics of Dengue.* BIOMAT 2011 International Symposium on Mathematical and Computational Biology. Edited by Rubem P. Mondaini.

Cintron-Arias A, **Sanchez F**, Wang X, Castillo-Chavez C, Gorman DM, and Gruenewald PJ. (2009) *The Role of Nonlinear Relapse on Contagion Amongst Drinking Communities. Mathematical and statistical estimation approaches in epidemiology.* Chowell G; Hyman JM; Bettencourt LMA; Castillo-Chavez C (Eds.).

Sanchez F, Wang X, Castillo-Chavez C, Gruenewald PJ, and Gorman DM. (2006) *Drinking as an epidemic–a simple mathematical model with recovery and relapse. Evidence-Based Relapse Prevention.* Edited by Witkiewitz K and Alan Marlatt G.

Chowell G, Cintron-Arias A, Del Valle S, **Sanchez F**, Song B, Hyman JM, Hethcote HW, and Castillo-Chavez C. (2006) *Mathematical applications associated with the deliberate release of infectious agents.* Modeling The Dynamics of Human Diseases: Emerging Paradigms and Challenges. AMS Contemporary Mathematics Series. Gumel A (Chief Editor), Castillo-Chavez C, Clemence DP, and Mickens RE.

Sanchez F, Engman M, Harrington L, and Castillo-Chavez C. (2006) *Models for Dengue Transmission and Control.* Modeling The Dynamics of Human Diseases: Emerging Paradigms and Challenges. AMS Contemporary Mathematics Series. Gumel A. (Chief Editor), Castillo-Chavez C, Clemence DP and Mickens RE.

G. Chowell and **Sanchez F**. (2006) *An Outbreak of Dengue in Mexico,* 2003*: Quantifying the role of interventions.* Journal of Environmental Health **68**(10), 40-44.

Gjorgjieva J, Smith K, Snyder J, Chowell-Puente G, **Sanchez F**, and Castillo-Chavez C. (2005) *The Role of Vaccination in the Control of SARS.* Mathematical Biosciences and Engineering **2**(4), 753-769.

Murillo D, Ortiz A, and **Sanchez F**. (2005) *A Mathematical Comparison of Prevention Strategies for Addicted Women.* Sonoran Journal of Graduate Mathematics Issue **1**.

Preprints

Espinoza B, Sánchez R, Calvo-Monge J, Sanchez F. (2025) *The nexus between disease surveillance, adaptive human behavior and epidemic containment*, (*submitted*). https://arxiv.org/abs/2503.04527

Calvo-Monge J, Espinoza B, Sanchez F. (2024) *Interplay between Foraging Choices and Population Growth Dynamics*, (*submitted*). https://arxiv.org/abs/2408.02552

Calvo JG, Simoy MI, Aparicio JP, Chacón JE, Sanchez F. (2024) *Stochastic two-patch epidemic model with nonlinear recidivism*, (*submitted*). https://arxiv.org/abs/2405.10998

Espinoza B, Calvo-Monge J, Sanchez F, Marathe M. (2024) *Adaptive human behavior in epidemics on networks.*

García YE, Barboza LA, **Sanchez F**, Vásquez P, Calvo JG. (2021) *Wavelet Analysis of Dengue Incidence and its Correlation with Weather and Vegetation Variables in Costa Rica.* https://arxiv.org/abs/2107.05740

Technical Reports

Murillo B, **Sanchez F**. (2025)*Modeling Bulimia Nervosa in the Digital Age: The Role of Social Media.* https://arxiv.org/abs/2506.03491

Alfaro-Brenes J, Sevilla-Moreira D, **Sanchez F**. (2025) *Vaping and public health: Trends, risks, and regulatory challenges in the digital era.* https://doi.org/10.31235/osf.io/xg7jp_v1

Rodríguez G, Garita T, **Sanchez F**. (2025)*A Dynamical Systems Analysis of Trap Music Exposure and School Dropout Among Costa Rican Adolescents.* arXiv:2503.17392

García YE, Vásquez P, Calvo JG, Barboza L, **Sanchez F**, Rivas T, Mery G, Pérez MD. (2023) *Modelos matemáticos y análisis estadísticos implementados para el estudio de Covid-19 en Costa Rica.* https://hdl.handle.net/10669/90324

Garro V, Masís JJ, Alarcón GJ, Campos CD, Castro JA, León JM, **Sanchez F**. (2023)*Adicción a Redes Sociales: Un Modelo Matemático.* https://hdl.handle.net/10669/90106

Serracín-Morales A, Herrera-Garro C, **Sanchez F**. (2022) *Modeling the university drinking culture phenomenon.* https://www.kerwa.ucr.ac.cr/handle/10669

Aguilar-Álvarez D, Sáenz JA, **Sanchez F**. (2022) *The Impact of Help-Seeking for Depression: A Mathematical Model*. https://www.kerwa.ucr.ac.cr/handle/10669

Mata-Boschini LD, Salas-Jiménez D, **Sanchez F**. (2022) *A basic model for the propagation of ideologies*. https://www.kerwa.ucr.ac.cr/handle/10669

Transit Models in Costa Rica: An Overview
Universidad de Costa Rica, Escuela de Matemática 2016.

The effect of rural/urban movement on Dengue transmission dynamics
Arizona State University, Mathematical & Theoretical Biology Institute 2014.

Social Dynamics of Gang Involvement: A Mathematical Approach
Arizona State University, Mathematical & Theoretical Biology Institute 2011.

Mathematical Modeling of the Sex Worker Industry as a Supply and Demand System
Arizona State University, Mathematical & Theoretical Biology Institute 2006.

Mathematical Modeling of Cigarette Smoking among Adolescents as an Infectious Disease
Arizona State University, Mathematical & Theoretical Biology Institute 2006.

The Effects of Myeloid Cells on Tumor-Immune System Interaction in Different Time Scales
Arizona State University, Mathematical & Theoretical Biology Institute 2006.

Effects of Lifestyle Choices on Atherosclerosis: A Mathematical Approach
Los Alamos National Laboratory, MTBI-02-05M, Mathematical & Theoretical Biology Institute 2005.

The Impact of Mosquito-Bird Interaction on the Spread of West Nile Virus to Human Populations
Los Alamos National Laboratory, Mathematical & Theoretical Biology Institute 2004.

The Role of Vaccination in the Control of SARS
Los Alamos National Laboratory, Mathematical & Theoretical Biology Institute 2004.

Change in Host Behavior and its Impact on the Co-evolution of Dengue
Los Alamos National Laboratory, BU-1639-M, Mathematical & Theoretical Biology Institute 2003.

Preventing Crack Babies: Different Approaches of Prevention
Cornell University, BU-1623-M, Mathematical & Theoretical Biology Institute 2002.

Small World and other networks
Cornell University, BU-1588-M, Mathematical & Theoretical Biology Institute 2001.

Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse
Cornell University, BU-1527-M, Mathematical & Theoretical Biology Institute 2000.

2D SEDFLUX
University of Colorado at Boulder Institute of Arctic & Alpine Research, Report, 1999.

Workshops

Co-organized the workshop *Workshop on climate change, human behavior, and vector-borne diseases* held at the University of California Davis, May 18-19, 2022.

Columbia University Workshop
Co-organizer: Research Collaboration EpiMEC-Columbia-UC Davis, July 1822, 2022.

Press

COVID-19 Research: Live Modeling for Decision-Making Process in Costa Rica

During the COVID-19 pandemic, I led the EpiMEC modeling research team, which collaborated closely with the public health authorities and the Costa Rican government. We provided critical insights through mathematical, statistical, and computational models, formulating crucial projections in guiding the nation's decision-making processes.

Press (COVID-19 Pandemic)

- OPS: Ministerio de Salud, OPS y Universidad de Costa Rica analizan futuras aplicaciones de la modelación matemática para la salud pública
- UCR: Aportes de la UCR han sido vitales en la lucha contra la pandemia por el COVID-19
- Teletica: COVID-19: Lo que podríamos esperar
- La Nación: Costa Rica tendría 80.000 enfermos, 800 muertos y hospitales colapsados si no hubiera tomado medidas contra covid-19
- UCR: CIMPA-UCR realizó para el Gobierno modelaciones estadísticas de contagios si varían las medidas de contención del virus

Vector-borne Diseases Research

UCREA Project

Mathematical Models for the Development of Prevention/Control Strategies of Aedes aegypti in Costa Rica

- UCR: En la UCR la ciencia y la vigilancia se unen contra el 'Aedes aegypti'
- UCR: Simulación virtual de modelos matemáticos para reducir el dengue, zika y chikungunya iniciará en enero del 2019
- UCR: Investigadores inician innovador modelo matemático para combatir el dengue, zika y chikungunya
- Teletica: Expertos desarrollan modelo matemático contra dengue
- Radio Monumental: 13 investigadores unen conocimientos para luchar contra el dengue, zika y chikungunya
- UCR: Costa Rica pronto tendrá un modelo matemático especializado contra tres enfermedades virales
- UCR: Matemático visitó Costa Rica para fortalecer modelo contra brotes epidémicos
- CRHoy: Con modelo matemático buscan combatir dengue y zika
- El País: Investigadores inician innovador modelo matemático para combatir el dengue, zika y chikungunya
- La República: UCR desarrolla primer modelo matemático del país que combatirá el *Aedes aegypti*

Dengue and Chikungunya Research)

Sanchez F, Barboza L, D. Burton, A. Cintron. *Comparative analysis of dengue versus chikungunya outbreaks in Costa Rica.* Ricerche di matematica, **67**(1), 163-174 (2018).

- UCR: Ticos podrían estar recibiendo diagnóstico erróneo de dengue y chikungunya
- La Repúbica: UCR advierte sobre diagnósticos erróneos de dengue y chikunguña

Alcohol Research

From *SIAM News*, Volume **40**, Number 3, April 2007
By Brandy Benedict, *Modeling Alcoholism as a Contagious Disease: How "Infected" Drinking Buddies Spread Problem Drinking.* https://archive.siam.org/news/news.php?id=1113.

Editorial Boards

1. Founder and Editor-in-Chief of the scientific journal Epi-SCIENCE (October 2021 - present)
2. Nature (Scientific Reports) Academic Editor (October 2024 - present)
3. PLOS One Academic Editor (August 2018 - present)
4. Revista de Matemática: Teoría y Aplicaciones (December 2018 - 2020)

Service

Comisión Institucional para Control del *Aedes aegypti* (CIAD), 2015-present.
Article reviewer, Mathematical Reviews/MathSciNet, 2020-present.
Article reviewer, Scientific Reports, 2024.
Article reviewer, PLOS Neglected Tropical Diseases, 2021-present.
Article reviewer, Journal of Biological Dynamics, 2012-present.
Article reviewer, PLOS Global Public Health, 2022.
Article reviewer, Computational and Applied Mathematics, 2021.
Article reviewer, European Journal of Applied Mathematics, 2021.
Article reviewer, Bulletin of Mathematical Biology, 2021.
Article reviewer, Mathematical Biosciences, 2019-2020.
Article reviewer, Journal of Theoretical Biology, 2012, 2015-2020.
Article reviewer, Emerging Infectious Diseases (CDC), 2016.
Article reviewer, Mathematical Biosciences and Engineering, 2016-2019.
Article reviewer, Revista de Matemática: Teoría y Aplicaciones, 2014-2017.
Article reviewer, Theoretical Population Biology, 2012.
Article reviewer, Applied Mathematics and Computation, 2012.
Article reviewer, Applied Mathematics and Computation, December 2011.

Grants & Awards

Universidad de Costa Rica (2023)
UCREA (Espacio Universitario de Estudios Avanzados)
Project: "El costo de una vida digna en Costa Rica Ingreso vital y la construcción de metodologías para el cálculo de variaciones territoriales."

University of California Davis - Seed Grant (2022)
Biostatistics, Public Health Sciences
Project: "Mathematical Models for Dengue Surveillance: Challenges and Opportunities."

Universidad de Costa Rica (2020)
UCREA (Espacio Universitario de Estudios Avanzados)
Project: "LaBsiq: Medidas de educación comunitarias para la prevención de arbovirosis en un cantón modelo (Siquirres)."

Universidad de Costa Rica (2019)
Vicerrectory of Research
Red EcoVector

Universidad de Costa Rica (2018)
Vicerrectory of Research
Postdoctoral grant
Awarded to the project: "Mathematical Models for the Development of Prevention/Control Strategies of *Aedes aegypti* in Costa Rica."

Universidad de Costa Rica (2018)
UCREA (Espacio Universitario de Estudios Avanzados)
Project: "Mathematical Models for the Development of Prevention/Control Strategies of *Aedes aegypti* in Costa Rica."

Joint SIAM-SMB Conference on the Life Sciences
Oral Presentation award winner 2006, *Mathematical Modeling of Cigarette Smoking among Adolescents as an Infectious Disease*
Co-advisor.

Society for the Advancement and Native Americans in Science (SACNAS) Conference
Co-directed undergraduate projects (poster award winner) 2004.

AMS (American Mathematical Society), Poster award winner 2000
Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse
Co-directed undergraduate research projects (poster award winners) 2003 and 2004.

MIT Biology Undergraduate Student Association's Annual Howard Hughes Research Symposium
Poster award winner 2000, *Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse*

Universidad Metropolitana, *Excellence Award* 2000 – 2001
Universidad Metropolitana, *Honors Award* 1999 – 2001
Universidad Metropolitana, *MIE scholar* 1998 – 2001

Scholarly Presentations

Oral presentations

Jornadas de Investigación, Acción Social y Docencia, Universidad de Costa Rica
El costo de una vida digna en Costa Rica, September 2024
Session: Moderator/Panelist

Investigación en Ciencias Básicas en la UCR, Semana C, Universidad de Costa Rica
Innovación en la Modelación Matemática a través de la Inteligencia Artificial, August 2024
Session: Invited speaker

Global Pervasive Computational Epidemiology (GPCE), University of Virginia
Interactions in the Age of Data: Exploring Adaptive Human Connections, March 2024
Session: Invited speaker

XXIV Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (XXIV SIMMAC), Universidad de Costa Rica
A nonlinear relapse model with disaggregated contact rates: analysis of a forward-backward bifurcation, February 2024
Session: Invited speaker

Data Coffee 2023, Universidad de Costa Rica
Interacciones en la Era de los Datos: Explorando Conexiones Humanas Adaptables, October 2023
Session: Panelist

Investigación en Ciencias Básicas en la UCR, Semana C, Universidad de Costa Rica
Un modelo de recada no lineal con tasas de contacto desagregadas, September 2023
Session: Invited speaker

CIMPA Workshop "Mathematics and Applications"
Adaptive Human Behavior in Mathematical Models, January 2023
Session: Invited speaker

Simposio EcoVector: Ecología de mosquitos como vectores de patógenos EcoVector Symposium: Ecology of mosquitoes as pathogen vectors
Vector-borne diseases in Costa Rica: A mathematical modeling approach, December 2022
Session: Invited speaker

MIDAS Latin America Seminar
Adaptive Human Behavior in Mathematical Models, November 2022
Session: Invited speaker

Science Summit at the United Nations General Assembly (UNGA77)
Modeling Covid-19 in Costa Rica: A Multilayer Network Approach, October 2022
Session: Invited speaker

25 Aniversario CIMPA, Universidad de Costa Rica
Comportamiento Humano Adaptativo en Modelos Matemáticos, September 2022
Session: Invited speaker

Investigación en Ciencias Básicas en la UCR, Semana C, Universidad de Costa Rica
Uso de Modelos Matemáticos en Problemas de Salud Poblacional, September 2022
Session: Invited speaker

Modelos Matemáticos en el Estudio de Epidemias, INCIENSA, June 2022
Session: Invited speaker

Retos en la colaboración interinstitucional ante problemas de interés nacional, Red-CONARE, February 2022
Session: Panelist

XXIII Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (XXIII SIMMAC), Universidad de Costa Rica
Modeling COVID-19 in Costa Rica: A Multilayer Network Approach, February 2022
Session: Invited speaker

Coloquio Escuela de Matemática, Universidad de Costa Rica
Modelos para el control de dengue (Revisited), November 2021
Session: Invited speaker

Webinar, CEVENCO
Modelos Matemáticos en Tiempos de Pandemia: Lecciones Aprendidas, October 2021
Session: Invited speaker

Simposio: Modelos y simulaciones epidemiológicas, CeNAT
Modelo de redes multicapa para Covid-19 en Costa Rica, August 2021
Session: Invited speaker

Mes de la Ciencia, Universidad de Costa Rica
Lecciones aprendidas del trabajo interdisciplinario en el desarrollo de modelos matemáticos para el SARS-CoV-2, August 2021
Session: Invited speaker

Actividad de Investigación 50 Aniversario Escuela de Matemática
Siguiendo el Rastro de lo Invisible Modelos Matemáticos en Tiempos de Pandemia - Lecciones Aprendidas, July 2021
Session: Invited speaker

3er Congreso Latinoamericano de Investigación y Educación Superior Interdisciplinaria
Mathematical Models in the Study of Epidemics: The Case of COVID-19 in Costa Rica, May 2021
Session: Invited speaker

80 Aniversario de la Universidad de Costa Rica - Sede del Atlántico
Los modelos matemáticos como el lenguaje de las epidemias, September, 2020. Session: Invited speaker

Institute for Pure & Applied Mathematics (IPAM), UCLA
Mathematical Models in Understanding COVID-19, August 2020
Session: Panelist

Centro de Investigación en Matemática Pura y Aplicada, Universidad de Costa Rica
Rol de los Modelos Matemáticos en Salud Pública, July 2020
Session: Panelist

III Conferencia Latinoamericana, BigDataLatam
Modelos matemáticos para el desarrollo de estrategias de prevención/control de Aedes aegypti en Costa Rica, May, 2019.
Session: Invited speaker

Congreso Internacional de Modelaje Matemático, Universidad Francisco Gavidia, El Salvador
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly

reported data, November, 2018.
Session: Invited speaker

European Conference on Mathematical and Theoretical Biology, Lisbon, Portugal
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data, July, 2018.
Session: Invited speaker

XXI SIMMAC Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias, Universidad de Costa Rica
A PDE Model with Age-Structure and Nonlinear Recidivism: Conditions for a Backward Bifurcation, February, 2018.
Session: Invited speaker

I Simposio Internacional sobre Arbovirosis en Costa Rica, Universidad de Costa Rica
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data, December, 2017.
Session: Invited speaker

Coloquio Departamento de Enseñanza, Universidad de Costa Rica
Modelos Matemáticos: Aplicaciones en Biología y Dinámica Social, September, 2017.
Session: Invited speaker

Celebración 20 Aniversario del CIMPA, Universidad de Costa Rica
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data, September, 2017.
Session: Plenary talk

Foro Comisión Institucional para Control del *Aedes aegypti*, Universidad de Costa Rica
Análisis Comparativo (dengue/chikungunya), July, 2017.
Session: Invited speaker

Foro de la Investigación en Ciencias Básicas, Universidad de Costa Rica
Análisis Comparativo (dengue/chikungunya), April, 2017.
Session: Invited speaker

Max Planck Institute Visit, Universidad de Costa Rica
Epidemic Models: Vector-Borne Diseases, May, 2016.
Session: Invited speaker

Coloquio en Matemática Aplicada y Estadística, Universidad de Costa Rica
Epidemic Models: Influenza and Vector-Borne Diseases, April, 2016.
Session: Invited speaker

XX SIMMAC Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias, Universidad de Costa Rica
Nonlinear Differential Equation Models of Vector-Borne Diseases: The Case of Chikungunya in Costa Rica, February, 2016.
Session: Plenary talk

Universidad de Costa Rica, Sede de Turrialba
III Encuentro de Profesores de la Enseñanza de la Matemática 2015
Social Dynamics of Gang Involvement: A Mathematical Approach
Session: Invited speaker

Instituto Tecnológico de Costa Rica
Semana de Biotecnología
Impacto de Modelos Matemáticos en Epidemiología y Salud Pública, September, 2014.
Session: Invited speaker

Universidad Nacional de Costa Rica
Impacto de Modelos Matemáticos en Epidemiología y Dinámica Social, May, 2014.
Session: Invited speaker

XIX SIMMAC Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias, Universidad de Costa Rica
Impacto de Modelos Matemáticos: Dengue Fever, February, 2014.
Session: Invited speaker

Universidad de Costa Rica, Escuela de Matemática
Impacto de Modelos Matemáticos en Epidemiología y Dinámica Social, June, 2013.
Session: Invited speaker

BIOMAT 2011, 11th International Symposium on Mathematical and Computational Biology, Santiago Chile
Dengue Fever Modeling: Challenges to Public Health Officials, November, 2011.
Session: Keynote speaker

Taller sobre el Enfoque Ecosistémico en Salud Humana con personal de instituciones en la Región Brunca, Costa Rica
El Posible Impacto de Modelos de Dengue: Los retos a Oficiales de Salud Pública, August, 2011.

Delays and Partial Differential Equations in Epidemiology Mini-Workshop
Possible Impact of Dengue Fever Modeling: Challenges to Public Health Officials, June, 2011.
Session: Invited speaker

Maricopa County Department of Public Health
Introduction to Mathematical Modeling of Infectious Disease Transmission, May, 2011.
Session: Invited speaker

Unraveling Complex Systems: Mathematical Biology Mini-Symposium
Dengue Fever Modeling, its Challenges and Their Connection to Reality, April, 2011.
Session: Math Awareness Month – Invited speaker

Graduation Ceremony Keynote Speaker, Universidad Metropolitana, Cupey, PR, 2007

Joint SIAM-SMB Conference on the Life Sciences
Social contagion in drinking communities, August 2006.
Session: Recent Advances in Mathematical Epidemiology

Society for Industrial and Applied Mathematics (SIAM)
Diversity Day
Models of Dengue Fever and their Public Health Implications, July 2005.

Society for Industrial and Applied Mathematics (SIAM)
Math-Sociology: A Drinking Behavior Model, July 2005.
Session: Theoretical Biology and Dynamical Systems

Society for Industrial and Applied Mathematics (SIAM)
Under what conditions will drinking become established in a community?, July 2004.
Session: Dynamics in Social Networks

Society for Industrial and Applied Mathematics (SIAM)
Models of Dengue Fever, July 2003.
Session: Theoretical Biology and Nonlinear Dynamics

Prevention Research Center, Berkeley CA
Under what conditions will drinking become established in a community, May 2004.

Los Alamos National Laboratory Mathematical Biology Conference
Computational and Mathematical Approaches to Homeland Security, Public Health Policy and Control: Challenges Posed by Emerging and Reemerging Diseases.
Stability of Disease-Free and Endemic Equilibria for Models of Dengue Fever, June 2003.

Universidad Metropolitana, Cupey PR
Student keynote speaker (Undergraduate Symposium XIV, October 2003)

Universidad Metropolitana
Small World and other networks, Undergraduate Symposium XII, October 2001.

Poster Presentations

Latin American Congress of Probability and Mathematical Statistics
Universidad de Costa Rica, San José, Costa Rica 2016
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data, December 2016

Workshop for Young Researchers in Mathematical Biology
Mathematical Biosciences Institute, Columbus, Ohio 2011
Possible Impact of Dengue Fever Modeling: Challenges to Public Health Officials, September 2011

Snowbird Conference, Snowbird, Utah 2005
Modeling Approaches for Drinking and Alcohol Abuse Dynamics, July 2005.

IPAM, UCLA Blackwell-Tapia Conference
Modeling Approaches for Drinking and Alcohol Abuse Dynamics, November 2004.

Gordon Research Conference (GRC)
Theoretical Biology & Biomathematics
Models for Dengue Transmission and Control, June 2003.

University of Iowa Mathematical Biology Conference
Models for Dengue Transmission and Control, November 2003.

Los Alamos National Laboratory, (T-D Divisions workshop)
Models for Dengue Transmission and Control, May 2003.

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)
Small World and other networks, September 2001.

Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)
Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse, September 2000.

American Mathematical Society (AMS)
Small World and other networks, January 2001.

American Mathematical Society (AMS)
Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse, January 2000.

Universidad Metropolitana
2D SEDFLUX, Undergraduate Symposium X, October 1999.
Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse, Undergraduate Symposium XI, October 2000.

Professional Affiliations

American Mathematical Society (AMS)
The Society for Mathematical Biology (SMB)
Society for Industrial and Applied Mathematics (SIAM)
Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

Computer Skills

Programming Languages: Python, Matlab, XPP

Operating Systems: Mac OS, Linux, Unix, Windows

Languages

Fluent in Spanish and English