

Fabio A. Sanchez, Ph.D.

Professor of Mathematics · Escuela de Matemática, Universidad de Costa Rica

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Research interests: mathematical biology, epidemic models, adaptive human behavior, public health, arboviruses (dengue, chikungunya, Zika), social dynamics.

EDUCATION

January 2007	Ph.D., Biological Statistics and Computational Biology Cornell University, Ithaca, NY — <i>Sloan Scholar</i> Thesis: <i>Theoretical Studies in Epidemiology and Social Dynamics</i> Adviser: Dr. Carlos Castillo-Chávez
June 2001	B.S. in Computer Science, Minor in Mathematics Universidad Metropolitana, Cupey, Puerto Rico

PROFESSIONAL EXPERIENCE

Sep 2025 – present	Professor <i>Universidad de Costa Rica</i> — San José, Costa Rica Teaching duties. Conduct research in applied mathematics.
Aug 2019 – Sep 2025	Associate Professor <i>Universidad de Costa Rica</i> — San José, Costa Rica Teaching duties. Conduct research in applied mathematics.
Mar 2019 – Feb 2023	Director, Applied Mathematics Department <i>Universidad de Costa Rica</i> — San José, Costa Rica Oversaw the management of applied mathematics courses.
Mar 2019 – Aug 2019	Adjunct Professor <i>Universidad de Costa Rica</i> — San José, Costa Rica Teaching duties. Conduct research in applied mathematics.
Aug 2017 – Aug 2018	Invited Professor <i>Universidad de Costa Rica</i> — San José, Costa Rica Teaching duties. Conduct research in applied mathematics.
Aug 2014 – Aug 2017	Visiting Professor <i>Universidad de Costa Rica</i> — San José, Costa Rica Teaching duties. Conduct research in applied mathematics.
Aug 2016 – Dec 2016 Feb 2023 – present	Mathematics Teacher <i>Colegio Científico Costarricense (San Pedro)</i> — San Pedro, Costa Rica Teach precalculus, calculus, and a special topics course.
Jul 2012 – Dec 2014	Math, Science & Computer Teacher <i>The European School</i> — Heredia, Costa Rica High school mathematics, science, and computer teacher.

Jul 2012 – Jun 2015	Adjunct Faculty <i>Arizona State University</i> — Tempe, Arizona Conduct research in applied mathematics.
Oct 2010 – Jul 2012	Assistant Research Professor <i>Arizona State University</i> — Tempe, Arizona Conduct research in applied mathematics.
Jun 2 – Jul 2, 2010	Summer Director / Faculty, Mathematical and Theoretical Biology Institute (MTBI) Puerto Rico <i>Universidad Metropolitana</i> — Cupey, Puerto Rico The program provides research experience for undergraduate students in applied mathematics and related fields. The director manages students (undergraduates and graduates) and assigns duties to those involved in the program, organizes the student lecture schedule, visitors, and any social or academic activity related to the program. During the second part of the program, the director advises multiple groups on their projects and is responsible for the quality of the final report. This program is based on the MTBI program at Arizona State University.
Feb 2007 – Jun 2015	Adjunct Faculty <i>Arizona State University</i> — Tempe, Arizona Conduct research in applied mathematics.
Oct 2006 – Sep 2009	Manager, Credit Strategy <i>American Express</i> — Phoenix, Arizona Developed, implemented, and validated credit strategies: credit case setups, line reduction selection, Lending on Charge suspension and unsuspension, and charge purchasing capacity assignment to drive profitable growth of the Charge Card, Lending, and Lending on Charge businesses in Small Business markets. Focused 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 OPEN (small and medium business) customers.
Aug 2005 – Jul 2006	Instructor of Mathematics <i>Arizona State University</i> — Tempe, Arizona Courses: Multivariable Calculus (Calculus III) and Calculus for Business.

Jun 6 – Jul 27, 2006	MTBI Summer Director <i>Arizona State University</i> — Tempe, Arizona The Mathematical and Theoretical Biology Institute was established in 1996 by Prof. Carlos Castillo-Chávez at Cornell University. The program provides research experience for undergraduate students in applied mathematics and related fields. The director manages students (undergraduates and graduates), assigns duties, organizes the lecture schedule, visitors, and all social and academic activities, and during the second part of the program advises multiple groups on 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
Summer 2004 – Summer 2005	MTBI Assistant Coordinator <i>Los Alamos National Laboratory</i> — Los Alamos, New Mexico Organized class schedules and computer labs. Developed and taught XPPAUT (dynamical systems software) computer labs. Directed undergraduate projects.
May 2004	Consultant (Ph.D. Candidate) <i>Prevention Research Center</i> — Berkeley, California Served as a consultant to the Prevention Research Center. Proposed the use of mathematical models to study drinking dynamics.
Jan 2003 – Jan 2004	Graduate Research Assistant <i>Los Alamos National Laboratory</i> — Los Alamos, New Mexico Collaborated with lab scientists from different fields on topics related to mathematical biology.
June 2003	Conference Co-organizer <i>Los Alamos National Laboratory</i> — Los Alamos, New Mexico Co-organizer of the conference <i>Computational and Mathematical Approaches to Homeland Security, Public Health Policy and Control: Challenges Posed by Emerging and Reemerging Diseases</i>.

TEACHING EXPERIENCE

Universidad de Costa Rica, Escuela de Matemática — August 2013 – present
Colegio Científico Costarricense (San Pedro) — 2016, 2023 – present

2026 – Ciclo II	Universidad de Costa Rica MA0550 – Ecuaciones Diferenciales para Enseñanza Colegio Científico Costarricense MA1001 – Cálculo (Undécimo); Aplicaciones (Décimo)
2026 – Ciclo I	Universidad de Costa Rica PF1366 – Introducción a la Modelación Matemática Colegio Científico Costarricense MA1001 – Cálculo (Undécimo); Lógica (Décimo)

2025 – Ciclo II	Universidad de Costa Rica MA0550 – Ecuaciones Diferenciales para Enseñanza Colegio Científico Costarricense MA0125 – Precálculo (Décimo); Lógica (Undécimo)
2025 – Ciclo I	Universidad de Costa Rica CA0151 – Cálculo para Ciencias Actuariales Colegio Científico Costarricense MA0125 – Precálculo (Décimo); Lógica (Undécimo)
2024 – Ciclo II	Universidad de Costa Rica CA0151 – Cálculo para Ciencias Actuariales MA0406 – Investigación de Operaciones I PF1364 – Modelos Matemáticos y sus Aplicaciones II Colegio Científico Costarricense MA1001 – Cálculo (Undécimo); Álgebra Lineal (Décimo)
2024 – Ciclo I	Universidad de Costa Rica PF1354 – Modelos Matemáticos y sus Aplicaciones Colegio Científico Costarricense MA1001 – Cálculo (Undécimo); Álgebra Lineal (Décimo)
2023 – Ciclo II	Universidad de Costa Rica PF1301 – Probabilidad Aplicada Colegio Científico Costarricense MA0125 – Precálculo (Décimo); Aplicaciones de Modelos Matemáticos en Biología (Undécimo)
2023 – Ciclo I	Universidad de Costa Rica MA0602 – Matemáticas en las Ciencias SP1312 – Ecuaciones Diferenciales II PF1364 – Aplicaciones de Sistemas Dinámicos Colegio Científico Costarricense MA0125 – Precálculo (Décimo); Aplicaciones de Modelos Matemáticos en Biología (Undécimo)
2022 – Ciclo II	Universidad de Costa Rica PF1354 – Modelos Matemáticos y sus Aplicaciones
2022 – Ciclo I	Universidad de Costa Rica MA0800 – Seminario de Matemática
2021 – Ciclo II	Universidad de Costa Rica MA0550 – Ecuaciones Diferenciales para Enseñanza
2021 – Ciclo I	Universidad de Costa Rica MA0602 – Matemáticas en las Ciencias
2020 – Ciclo II	Universidad de Costa Rica MA0550 – Ecuaciones Diferenciales para Enseñanza
2020 – Ciclo I	Universidad de Costa Rica PF1354 – Modelos Matemáticos y sus Aplicaciones MA0602 – Matemáticas en las Ciencias
2019 – Ciclo II	Universidad de Costa Rica MA0550 – Ecuaciones Diferenciales para Enseñanza

2019 – Ciclo I	Universidad de Costa Rica MA1005 – Ecuaciones Diferenciales para Ingeniería
2018 – Ciclo II	Universidad de Costa Rica MA0550 – Ecuaciones Diferenciales para Enseñanza
2018 – Ciclo I	Universidad de Costa Rica MA1005 – Ecuaciones Diferenciales para Ingeniería (Coordinator)
2017 – Ciclo II	Universidad de Costa Rica MA2210 – Ecuaciones Diferenciales Aplicadas, Group 3 (Coordinator)
2017 – Ciclo I	Universidad de Costa Rica MA2210 – Ecuaciones Diferenciales Aplicadas, Group 5 (Coordinator) MA2210 – Ecuaciones Diferenciales Aplicadas, Group 6
2016 – Ciclo II	Universidad de Costa Rica MA2210 – Ecuaciones Diferenciales Aplicadas, Group 2 (Coordinator) Colegio Científico Costarricense MA0125 – Precálculo (Décimo); Modelación (Undécimo)
2016 – Ciclo I	Universidad de Costa Rica MA2210 – Ecuaciones Diferenciales Aplicadas, Group 1 (Coordinator) MA2210 – Ecuaciones Diferenciales Aplicadas, Group 2
2015 – Ciclo II	Universidad de Costa Rica MA1006 – Análisis Numérico, Group 1 (Coordinator)
2015 – Ciclo I	Universidad de Costa Rica MA0292 – Álgebra Lineal, Group 3 MA1006 – Análisis Numérico, Group 2 (Coordinator)
2014 – Ciclo II	Universidad de Costa Rica MA1004 – Álgebra Lineal, Group 15 MA1006 – Análisis Numérico, Group 2
2014 – Ciclo I	Universidad de Costa Rica MA1004 – Álgebra Lineal, Groups 3 and 5
2013 – Ciclo II	Universidad de Costa Rica MA1001 – Cálculo I, Group 29
Jul 2012 – Dec 2013	The European School, Heredia, Costa Rica High school mathematics, science, and computer science.

Fall 2012	Arizona State University AML 493 – Honors Directed Study AML 294 – Special Topics: From Cells to Societies <i>Course content.</i> 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. Concepts introduced 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 better understand what makes them sustainable and adaptable, and helps explain the role of diversity, what stimulates innovation, and why people cooperate.
Summers 2002–2009, 2011, 2014	Arizona State University – MTBI Summer Program 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.
Spring 2012	Arizona State University AML 492 – Honors Directed Study
Fall 2011	Arizona State University AML 100 – Introduction to Applied Mathematics in the Life & Social Sciences AML 610 – Topics in Mathematical Ecology and Epidemiology
Summers 2010, 2011	Arizona State University – Joaquin Bustoz Math-Science Honors Program 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 studies in mathematics and science before graduating from high school. It is designed to provide a successful university experience for underrepresented students in mathematics and science and to enhance their prospects for academic success.
Jun 2 – Jul 2, 2010	Universidad Metropolitana – MTBI Puerto Rico Topics included dynamical systems, backward bifurcations, epidemic models, and social dynamics.

RESEARCH MENTORSHIP

Graduate students and postdocs, Universidad de Costa Rica

In progress	Geraldine Rodríguez — Master’s student. Expected graduation: TBA.
In progress	José Mario Castro — Master’s student. Expected graduation: TBA.
In progress	Róger Sánchez — Master’s student. Expected graduation: December 2026.

In progress	Cinthya Arce — Master's student. Expected graduation: TBA.
In progress	Arturo Vega — Master's student. Expected graduation: TBA.
Graduated Sep 1, 2026	Daniela Sevilla — Master's student. <i>Thesis (joint with Jordy Alfaro):</i> Modelado del uso del vapeo en Costa Rica: un enfoque epidemiológico. <i>Related preprint:</i> Alfaro-Brenes J, Sevilla-Moreira D , Sanchez F. (2025) Vaping and public health: Trends, risks, and regulatory challenges in the digital era. SocArXiv. doi:10.31235/osf.io/xg7jp_v1
Graduated Sep 1, 2026	Jordy Alfaro — Master's student. <i>Thesis (joint with Daniela Sevilla):</i> Modelado del uso del vapeo en Costa Rica: un enfoque epidemiológico. <i>Related preprint:</i> Alfaro-Brenes J , Sevilla-Moreira D, Sanchez F. (2025) Vaping and public health: Trends, risks, and regulatory challenges in the digital era. SocArXiv. doi:10.31235/osf.io/xg7jp_v1
Graduated Sep 13, 2023	Jimmy Calvo-Monge — Master's student. <i>Thesis:</i> Development and analysis of human adaptive behavior in a model with non-linear relapse. <i>Thesis publication:</i> 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. <i>Infectious Disease Modelling</i> 8(3). doi:10.1016/j.idm.2023.06.004
Graduated Mar 14, 2023	John Orozco — Master's student. <i>Thesis:</i> Asociación entre la introducción de la vacuna contra la COVID-19 y el Índice Mensual de Actividad Económica en Costa Rica.
Jan – Dec 2020	Yury E. García, Ph.D. — Postdoctoral researcher.
Graduated Sep 25, 2020	Paola Vásquez, M.D. — Master's student. <i>Thesis:</i> Uso del aprendizaje automatizado y de variables climáticas como herramienta para la predicción del riesgo de dengue en Costa Rica, periodo 2007–2017. <i>Thesis publication:</i> 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. <i>Revista de Matemática: Teoría y Aplicaciones</i> , Special issue <i>Mathematical Modeling: A New Frontier</i> 27(1), 1–21. doi:10.15517/RMTA.V27I1.39931

Undergraduate research and collaborative projects

Summer 2014	Arizona State University – MTBI Summer Program Directed an undergraduate project in applied mathematics: <i>The effect of rural/urban movement on Dengue transmission dynamics</i> . Advisor: Dr. Fabio Sanchez.
April 2012	School of Human Evolution & Social Change Undergraduate Research Symposium , Arizona State University Poster: <i>Analyzing Public Good Games and Group Cooperation in Academia using Agent-Based Computer Simulations</i> , by Erik Thunberg and Mary Hayes. Mentor: Fabio Sanchez.

August 2011

ASU–UCR–Ministry of Health Collaborative Dengue Fever Pilot Project

The Universidad de Costa Rica (UCR) – Arizona State University (ASU) Collaborative Dengue Fever Project is a data-gathering project whose primary objective is to start a dialogue between Arizona State University, Universidad de Costa Rica, and the Ministry of Health of Costa Rica. This pilot project may lead to a future grant proposal from a United States agency if the collaboration between all entities continues long-term. The primary goal was to collect preliminary data; a possible outcome is a collaborative paper with all participants (ASU, UCR, and Ministry of Health officials) as coauthors.

The 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 UCR. Dr. José Bonilla (Director), Ivannia Atmetlla, Dr. Sandra Silva, and Dr. Xinia Barrantes provided the lab space and valuable staff support. This specificity prevalence study allows us to determine the proportion of infected mosquitoes in a specific area and evaluate the ecological and environmental variables that could affect dengue prevalence. Individual mosquito specimens were also tested for genetic variability between *Aedes aegypti* from different sectors of the Buenos Aires area.

2007–2009, 2011

Arizona State University – MTBI Summer Program

Directed undergraduate projects in applied mathematics.

2003–2005

Los Alamos National Laboratory – MTBI Summer Program

Directed undergraduate projects in applied mathematics.

2000–2002

Cornell University – MTBI Summer Program

Directed undergraduate projects in applied mathematics.

1999

University of Colorado at Boulder – SMART Program

Programmed a GUI in Tcl/Tk (UNIX) for a large program used to measure river sedimentation (2D SEDFLUX). Advisor: Dr. James Syvitski.

PUBLICATIONS

1. Hidalgo HG, Alfaro EJ, **Sanchez F**, Troyo A, Maldonado T, Miranda-Chacón Z, Morales-Mora E, Solano-Gamboa M, Acosta-Quesada M. (2026) *High-resolution climate–dengue modeling and mid-century projections under SSP5-8.5 in Costa Rica*. *Science in One Health* **5**, 100157. doi:10.1016/j.soh.2026.100157
2. Calvo JG, Simoy MI, Aparicio JP, Chacón JE, **Sanchez F**. (2026) *Stochastic Dynamics in Epidemiological Models with Interconnected Populations*. *Journal of Biological Systems* **34**, 1–27. doi:10.1142/S0218339026500178
3. Arroyo-Esquivel J, Gehman A, Collins K, **Sanchez F**. (2026) *Managing populations after a disease outbreak: exploration of epidemiological consequences of managed host reintroduction following disease-driven host decline*. *Philosophical Transactions of the Royal Society B* **381**(1945), 20240333. doi:10.1098/rstb.2024.0333
4. Calvo-Monge J, Espinoza B, **Sanchez F**, Arroyo-Esquivel J. (2025) *Interplay between Foraging Choices and Population Growth Dynamics*. *PLOS One* **20**(6), e0325942. doi:10.1371/journal.pone.0325942
5. Soto-Rojas C, Garita C, Abdalah M, Calvo JG, **Sanchez F**, Meneses E. (2024) *Análisis preliminar de la correlación de variables socioeconómicas con modelado geoespacial en la epidemia de dengue en Costa Rica*. *Revista Tecnología en Marcha* **37**(7). doi:10.18845/tm.v37i7.7292
6. 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). doi:10.1007/s11538-024-01328-7

7. Chou-Chen S-W, 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**, 687–713. doi:10.1007/s10651-023-00580-9
8. 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. doi:10.1371/journal.pgph.0002417
9. 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). doi:10.1016/j.idm.2023.06.004
10. **Sanchez F**, Arroyo-Esquível J, and Calvo JG. (2023) *A mathematical model with nonlinear relapse: conditions for a forward-backward bifurcation.* Journal of Biological Dynamics **17**(1). doi:10.1080/17513758.2023.2192238
11. 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. doi:10.1371/journal.pntd.0011047
12. 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). doi:10.3934/mbe.2023024
13. **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. doi:10.1016/j.epidem.2022.100577
14. **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.* Revista Panamericana de Salud Pública **46**, e113. doi:10.26633/RPSP.2022.113
15. 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. doi:10.1038/s41598-022-06236-1
16. 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. doi:10.3390/life11121336
17. 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.* Epidemiologia **2**(3), 294–304. doi:10.3390/epidemiologia2030022
18. **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. doi:10.15517/RMTA.V27I1.39966
19. 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. doi:10.15517/RMTA.V27I1.39931
20. 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. doi:10.15517/RMTA.V27I1.39946

21. **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. doi:10.15517/RMTA.V27I1.39977
22. **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 & Mathematics with Applications **78**(12), 3916–3930. doi:10.1016/j.camwa.2019.06.021
23. **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. doi:10.3934/mbe.2019136
24. **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. doi:10.15517/RMTA.V26I1.36229
25. 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. doi:10.1016/j.mbs.2018.10.009
26. **Sanchez F**, Barboza L, Burton D, and Cintrón A. (2018) *Comparative analysis of dengue versus chikungunya outbreaks in Costa Rica*. Ricerche di Matematica **67**(1), 163–174. doi:10.1007/s11587-018-0362-3
27. 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. doi:10.30707/LiB1.2Murillo
28. **Sanchez F**, Murillo D, and Castillo-Chavez C. (2012) *Change in Host Behavior and its Impact on the Transmission Dynamics of Dengue*. In: BIOMAT 2011 – International Symposium on Mathematical and Computational Biology (R. P. Mondaini, Ed.).
29. Cintrón-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*. In: Mathematical and Statistical Estimation Approaches in Epidemiology (G. Chowell, J. M. Hyman, L. M. A. Bettencourt, C. Castillo-Chavez, Eds.).
30. **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*. In: Evidence-Based Relapse Prevention (K. Witkiewitz and G. A. Marlatt, Eds.).
31. Chowell G, Cintrón-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*. In: Modeling the Dynamics of Human Diseases: Emerging Paradigms and Challenges, AMS Contemporary Mathematics Series (A. Gumel, Chief Ed.; C. Castillo-Chavez, D. P. Clemence, R. E. Mickens, Eds.).
32. **Sanchez F**, Engman M, Harrington L, and Castillo-Chavez C. (2006) *Models for Dengue Transmission and Control*. In: Modeling the Dynamics of Human Diseases: Emerging Paradigms and Challenges, AMS Contemporary Mathematics Series (A. Gumel, Chief Ed.; C. Castillo-Chavez, D. P. Clemence, R. E. Mickens, Eds.).
33. Chowell G and **Sanchez F**. (2006) *An Outbreak of Dengue in Mexico, 2003: Quantifying the role of interventions*. Journal of Environmental Health **68**(10), 40–44.
34. 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.
35. 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

1. **Sanchez F.** (2026) *Private avoidance, public control: adaptive behavior and the collective-action problem in dengue*. Zenodo. doi:10.5281/zenodo.22286915
2. **Sanchez F.** (2026) *Directional dengue spread across Costa Rican cantons weakens as endemicity rises, 1993–2012*. Zenodo. doi:10.5281/zenodo.21865588
3. **Sanchez F.** (2026) *Relapse timing and the endemic basin: how the shape of the relapse hazard moves the fold (submitted)*. Zenodo. doi:10.5281/zenodo.21862238
4. **Sanchez F.** (2026) *The Social Life of R_0 : Why the reproduction number is less a fact about a virus than a rumor about the society it lands in*. SocArXiv. doi:10.31235/osf.io/ex32r_v1
5. **Sanchez F.** (2026) *State-dependent non-identifiability of the reproduction number under adaptive behavior: an empirical characterization from COVID-19 mobility*. medRxiv. doi:10.64898/2026.07.19.26358437
6. **Sanchez F.** (2026) *Network amplification of dengue declines as endemicity rises: climate-adjusted directional spread across Costa Rican cantons, 1993–2012*. arXiv:2607.05740
7. **Sanchez F.** (2026) *What R_0 Deletes: Eigenvectors, Non-Normality, and the Social Content of the Basic Reproduction Number (submitted)*. arXiv:2607.03979
8. **Sanchez F.** (2026) *When Self-Protection Backfires: Adaptive Contact Behavior Expands the Endemic Basin in an Addiction Model with Nonlinear Relapse (submitted)*. arXiv:2607.00421
9. Espinoza B, Calvo-Monge J, **Sanchez F**, Marathe M, Levin S. (2025) *Localized risk perception triggers early behavioral adaptations in epidemics on networks (submitted)*. arXiv:2508.05704
10. Hidalgo HG, Alfaro EJ, **Sanchez F**, Troyo A, Maldonado T, Miranda-Chacón Z, Morales-Mora E, Solano-Gamboa M, Acosta-Quesada M. (2025) *Climate factors related to the dengue incidence in Costa Rica and future projections under scenario SSP5-8.5*. EarthArXiv. doi:10.31223/X5T44R
11. Espinoza B, Sánchez R, Calvo-Monge J, **Sanchez F.** (2025) *The nexus between disease surveillance, adaptive human behavior and epidemic containment (submitted)*. arXiv:2503.04527
12. Arroyo-Esquivel J, Gehman A, Collins K, **Sanchez F.** (2025) *Managing populations after a disease outbreak: exploration of epidemiological consequences of managed host reintroduction following disease-driven host decline*. bioRxiv.
13. Calvo-Monge J, Espinoza B, **Sanchez F.** (2024) *Interplay between Foraging Choices and Population Growth Dynamics*. arXiv:2408.02552
14. Calvo JG, Simoy MI, Aparicio JP, Chacón JE, **Sanchez F.** (2024) *Stochastic two-patch epidemic model with nonlinear recidivism*. arXiv:2405.10998
15. 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*. arXiv:2107.05740

TECHNICAL REPORTS

1. Murillo B, **Sanchez F.** (2025) *Modeling Bulimia Nervosa in the Digital Age: The Role of Social Media*. arXiv:2506.03491
2. Alfaro-Brenes J, Sevilla-Moreira D, **Sanchez F.** (2025) *Vaping and public health: Trends, risks, and regulatory challenges in the digital era*. doi:10.31235/osf.io/xg7jp_v1
3. 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

4. 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*. hdl.handle.net/10669/90324
5. Garro V, Masís JJ, Alarcón GJ, Campos CD, Castro JA, León JM, **Sanchez F**. (2023) *Adicción a Redes Sociales: Un Modelo Matemático*. hdl.handle.net/10669/90106
6. Serracín-Morales A, Herrera-Garro C, **Sanchez F**. (2022) *Modeling the university drinking culture phenomenon*. [KÄlrwÄq, UniversidaddeCostaRica](https://hdl.handle.net/10669/90106)
7. Aguilar-Álvarez D, Sáenz JA, **Sanchez F**. (2022) *The Impact of Help-Seeking for Depression: A Mathematical Model*. [KÄlrwÄq, UniversidaddeCostaRica](https://hdl.handle.net/10669/90106)
8. Mata-Boschini LD, Salas-Jiménez D, **Sanchez F**. (2022) *A basic model for the propagation of ideologies*. [KÄlrwÄq, UniversidaddeCostaRica](https://hdl.handle.net/10669/90106)
9. *Transit Models in Costa Rica: An Overview*. Universidad de Costa Rica, Escuela de Matemática, 2016.
10. *The effect of rural/urban movement on Dengue transmission dynamics*. Arizona State University, Mathematical & Theoretical Biology Institute, 2014.
11. *Social Dynamics of Gang Involvement: A Mathematical Approach*. Arizona State University, Mathematical & Theoretical Biology Institute, 2011.
12. *Mathematical Modeling of the Sex Worker Industry as a Supply and Demand System*. Arizona State University, Mathematical & Theoretical Biology Institute, 2006.
13. *Mathematical Modeling of Cigarette Smoking among Adolescents as an Infectious Disease*. Arizona State University, Mathematical & Theoretical Biology Institute, 2006.
14. *The Effects of Myeloid Cells on Tumor-Immune System Interaction in Different Time Scales*. Arizona State University, Mathematical & Theoretical Biology Institute, 2006.
15. *Effects of Lifestyle Choices on Atherosclerosis: A Mathematical Approach*. Los Alamos National Laboratory, MTBI-02-05M, Mathematical & Theoretical Biology Institute, 2005.
16. *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.
17. *The Role of Vaccination in the Control of SARS*. Los Alamos National Laboratory, Mathematical & Theoretical Biology Institute, 2004.
18. *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.
19. *Preventing Crack Babies: Different Approaches of Prevention*. Cornell University, BU-1623-M, Mathematical & Theoretical Biology Institute, 2002.
20. *Small World and other networks*. Cornell University, BU-1588-M, Mathematical & Theoretical Biology Institute, 2001.
21. *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.
22. *2D SEDFLUX*. University of Colorado at Boulder, Institute of Arctic & Alpine Research, Report, 1999.

WORKSHOPS

May 18–19, 2022

Workshop on climate change, human behavior, and vector-borne diseases
Co-organizer. University of California, Davis.

PRESS

COVID-19 research: live modeling for decision-making 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 projections that guided the nation's decision-making processes.

- PAHO: [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, Burton D, Cintrón A. *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 República: [UCR advierte sobre diagnósticos erróneos de dengue y chikungunya](#)

Alcohol research

Benedict B. *Modeling Alcoholism as a Contagious Disease: How “Infected” Drinking Buddies Spread Problem Drinking*. *SIAM News* **40**(3), April 2007. archive.siam.org/news/news.php?id=1113

EDITORIAL BOARDS

Oct 2021 – present	Founder and Editor-in-Chief , <i>Epi-SCIENCE</i> (scientific journal)
Oct 2024 – present	Academic Editor , <i>Scientific Reports</i> (Nature Portfolio)
Mar 2023 – present	Academic Editor , <i>Frontiers in Epidemiology</i>
Aug 2018 – present	Academic Editor , <i>PLOS One</i>
Dec 2018 – 2020	Editorial Board , <i>Revista de Matemática: Teoría y Aplicaciones</i>

SERVICE

2015 – present	Member, Comisión Institucional para el Control del <i>Aedes aegypti</i> (CIAD), Universidad de Costa Rica
2019 – 2021	Member, Consejo Científico, CIMPA, Universidad de Costa Rica
2020 – present	Reviewer, Mathematical Reviews / MathSciNet

Manuscript reviewer for:

- Scientific Reports (2024)
- PLOS Neglected Tropical Diseases (2021 – present)
- Journal of Biological Dynamics (2012 – present)
- PLOS Global Public Health (2022)
- Computational and Applied Mathematics (2021)
- European Journal of Applied Mathematics (2021)
- Bulletin of Mathematical Biology (2021)
- Mathematical Biosciences (2019 – 2020)
- Journal of Theoretical Biology (2012, 2015 – 2020)
- Emerging Infectious Diseases, CDC (2016)
- Mathematical Biosciences and Engineering (2016 – 2019)
- Revista de Matemática: Teoría y Aplicaciones (2014 – 2017)
- Theoretical Population Biology (2012)
- Applied Mathematics and Computation (2011, 2012)

GRANTS & AWARDS

2023	UCREA (Espacio Universitario de Estudios Avanzados) , Universidad de Costa Rica Project: <i>El costo de una vida digna en Costa Rica: Ingreso vital y la construcción de metodologías para el cálculo de variaciones territoriales.</i>
2022	Seed Grant , University of California, Davis — Biostatistics, Public Health Sciences Project: <i>Mathematical Models for Dengue Surveillance: Challenges and Opportunities.</i>

2020	UCREA (Espacio Universitario de Estudios Avanzados) , Universidad de Costa Rica Project: <i>LaBsiq: Medidas de educación comunitarias para la prevención de arboviro-sis en un cantón modelo (Siquirres)</i> .
2019	Red EcoVector , Vice-Rectorcy of Research, Universidad de Costa Rica
2018	Postdoctoral grant , Vice-Rectorcy of Research, Universidad de Costa Rica Awarded to the project <i>Mathematical Models for the Development of Preven-tion/Control Strategies of Aedes aegypti in Costa Rica</i> .
2018	UCREA (Espacio Universitario de Estudios Avanzados) , Universidad de Costa Rica Project: <i>Mathematical Models for the Development of Prevention/Control Strategies of Aedes aegypti in Costa Rica</i> .
2006	Oral Presentation Award , Joint SIAM–SMB Conference on the Life Sciences <i>Mathematical Modeling of Cigarette Smoking among Adolescents as an Infectious Disease</i> (co-advisor).
2004	Poster Award , SACNAS Conference — co-directed undergraduate projects.
2000, 2003, 2004	Poster Awards , American Mathematical Society (AMS) 2000: <i>Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse</i> . 2003, 2004: co-directed undergraduate research projects.
2000	Poster Award , MIT Biology Undergraduate Student Association Annual Howard Hughes Research Symposium <i>Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse</i> .
2000 – 2001	Excellence Award , Universidad Metropolitana
1999 – 2001	Honors Award , Universidad Metropolitana
1998 – 2001	MIE Scholar , Universidad Metropolitana

SCHOLARLY PRESENTATIONS

Oral presentations

Oct 2025	POA Regional Conference , Universidad Nacional <i>Adaptive Behavior in Education</i> Invited speaker
Oct 2025	Seminario Académico , Universidad de Costa Rica, Sede de Occidente <i>¿Puede la música trap impulsar la deserción escolar? Un modelo dinámico de di-fusión cultural y riesgo educativo. De la exposición casual a la deserción: lo que dice el modelo (y lo que no)</i> Invited speaker
Sep 2024	Jornadas de Investigación, Acción Social y Docencia , Universidad de Costa Rica <i>El costo de una vida digna en Costa Rica</i> Moderator / Panelist

Aug 2024	Investigación en Ciencias Básicas en la UCR, Semana C , Universidad de Costa Rica <i>Innovación en la Modelación Matemática a través de la Inteligencia Artificial</i> Invited speaker
Mar 2024	Global Pervasive Computational Epidemiology (GPCE) , University of Virginia <i>Interactions in the Age of Data: Exploring Adaptive Human Connections</i> Invited speaker
Feb 2024	XXIV Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (SIMMAC) , Universidad de Costa Rica <i>A nonlinear relapse model with disaggregated contact rates: analysis of a forward-backward bifurcation</i> Invited speaker
Oct 2023	Data Coffee 2023 , Universidad de Costa Rica <i>Interacciones en la Era de los Datos: Explorando Conexiones Humanas Adaptables</i> Panelist
Sep 2023	Investigación en Ciencias Básicas en la UCR, Semana C , Universidad de Costa Rica <i>Un modelo de recaída no lineal con tasas de contacto desagregadas</i> Invited speaker
Jan 2023	CIMPA Workshop “Mathematics and Applications” <i>Adaptive Human Behavior in Mathematical Models</i> Invited speaker
Dec 2022	Simposio EcoVector: Ecología de mosquitos como vectores de patógenos <i>Vector-borne diseases in Costa Rica: A mathematical modeling approach</i> Invited speaker
Nov 2022	MIDAS Latin America Seminar <i>Adaptive Human Behavior in Mathematical Models</i> Invited speaker
Oct 2022	Science Summit at the United Nations General Assembly (UNGA77) <i>Modeling Covid-19 in Costa Rica: A Multilayer Network Approach</i> Invited speaker
Sep 2022	25 Aniversario CIMPA , Universidad de Costa Rica <i>Comportamiento Humano Adaptativo en Modelos Matemáticos</i> Invited speaker
Sep 2022	Investigación en Ciencias Básicas en la UCR, Semana C , Universidad de Costa Rica <i>Uso de Modelos Matemáticos en Problemas de Salud Poblacional</i> Invited speaker
Jun 2022	Modelos Matemáticos en el Estudio de Epidemias , INCIENSA Invited speaker
Feb 2022	Retos en la colaboración interinstitucional ante problemas de interés nacional , RedCONARE Panelist

Feb 2022	XXIII Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (SIMMAC) , Universidad de Costa Rica <i>Modeling COVID-19 in Costa Rica: A Multilayer Network Approach</i> Invited speaker
Nov 2021	Coloquio Escuela de Matemática , Universidad de Costa Rica <i>Modelos para el control de dengue (Revisited)</i> Invited speaker
Oct 2021	Webinar , CEVENCO <i>Modelos Matemáticos en Tiempos de Pandemia: Lecciones Aprendidas</i> Invited speaker
Aug 2021	Simposio: Modelos y simulaciones epidemiológicas , CeNAT <i>Modelo de redes multicapa para Covid-19 en Costa Rica</i> Invited speaker
Aug 2021	Mes de la Ciencia , Universidad de Costa Rica <i>Lecciones aprendidas del trabajo interdisciplinario en el desarrollo de modelos matemáticos para el SARS-CoV-2</i> Invited speaker
Jul 2021	Actividad de Investigación, 50 Aniversario Escuela de Matemática , Universidad de Costa Rica <i>Siguiendo el Rastro de lo Invisible: Modelos Matemáticos en Tiempos de Pandemia — Lecciones Aprendidas</i> Invited speaker
May 2021	3er Congreso Latinoamericano de Investigación y Educación Superior Interdisciplinaria <i>Mathematical Models in the Study of Epidemics: The Case of COVID-19 in Costa Rica</i> Invited speaker
Sep 2020	80 Aniversario de la Universidad de Costa Rica , Sede del Atlántico <i>Los modelos matemáticos como el lenguaje de las epidemias</i> Invited speaker
Aug 2020	Institute for Pure & Applied Mathematics (IPAM) , UCLA <i>Mathematical Models in Understanding COVID-19</i> Panelist
Jul 2020	Centro de Investigación en Matemática Pura y Aplicada (CIMPA) , Universidad de Costa Rica <i>Rol de los Modelos Matemáticos en Salud Pública</i> Panelist
May 2019	III Conferencia Latinoamericana, BigDataLatam <i>Modelos matemáticos para el desarrollo de estrategias de prevención/control de Aedes aegypti en Costa Rica</i> Invited speaker
Nov 2018	Congreso Internacional de Modelaje Matemático , Universidad Francisco Gavidia, El Salvador <i>Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data</i> Invited speaker

- Jul 2018 **European Conference on Mathematical and Theoretical Biology**, Lisbon, Portugal
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data
Invited speaker
- Feb 2018 **XXI Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (SIMMAC)**, Universidad de Costa Rica
A PDE Model with Age-Structure and Nonlinear Recidivism: Conditions for a Backward Bifurcation
Invited speaker
- Dec 2017 **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
Invited speaker
- Sep 2017 **Coloquio Departamento de Enseñanza**, Universidad de Costa Rica
Modelos Matemáticos: Aplicaciones en Biología y Dinámica Social
Invited speaker
- Sep 2017 **Celebración 20 Aniversario del CIMPA**, Universidad de Costa Rica
Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data
Plenary talk
- Jul 2017 **Foro Comisión Institucional para Control del *Aedes aegypti***, Universidad de Costa Rica
Análisis Comparativo (dengue/chikungunya)
Invited speaker
- Apr 2017 **Foro de la Investigación en Ciencias Básicas**, Universidad de Costa Rica
Análisis Comparativo (dengue/chikungunya)
Invited speaker
- May 2016 **Max Planck Institute Visit**, Universidad de Costa Rica
Epidemic Models: Vector-Borne Diseases
Invited speaker
- Apr 2016 **Coloquio en Matemática Aplicada y Estadística**, Universidad de Costa Rica
Epidemic Models: Influenza and Vector-Borne Diseases
Invited speaker
- Feb 2016 **XX Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (SIMMAC)**, Universidad de Costa Rica
Nonlinear Differential Equation Models of Vector-Borne Diseases: The Case of Chikungunya in Costa Rica
Plenary talk
- 2015 **III Encuentro de Profesores de la Enseñanza de la Matemática**, Universidad de Costa Rica, Sede de Turrialba
Social Dynamics of Gang Involvement: A Mathematical Approach
Invited speaker

Sep 2014	Semana de Biotecnología , Instituto Tecnológico de Costa Rica <i>Impacto de Modelos Matemáticos en Epidemiología y Salud Pública</i> Invited speaker
May 2014	Universidad Nacional de Costa Rica <i>Impacto de Modelos Matemáticos en Epidemiología y Dinámica Social</i> Invited speaker
Feb 2014	XIX Simposio Internacional de Métodos Matemáticos Aplicados a las Ciencias (SIMMAC) , Universidad de Costa Rica <i>Impacto de Modelos Matemáticos: Dengue Fever</i> Invited speaker
Jun 2013	Escuela de Matemática , Universidad de Costa Rica <i>Impacto de Modelos Matemáticos en Epidemiología y Dinámica Social</i> Invited speaker
Nov 2011	BIOMAT 2011, 11th International Symposium on Mathematical and Computational Biology , Santiago, Chile <i>Dengue Fever Modeling: Challenges to Public Health Officials</i> Keynote speaker
Aug 2011	Taller sobre el Enfoque Ecosistémico en Salud Humana , Región Brunca, Costa Rica <i>El Posible Impacto de Modelos de Dengue: Los retos a Oficiales de Salud Pública</i>
Jun 2011	Delays and Partial Differential Equations in Epidemiology Mini-Workshop <i>Possible Impact of Dengue Fever Modeling: Challenges to Public Health Officials</i> Invited speaker
May 2011	Maricopa County Department of Public Health <i>Introduction to Mathematical Modeling of Infectious Disease Transmission</i> Invited speaker
Apr 2011	Unraveling Complex Systems: Mathematical Biology Mini-Symposium , Math Awareness Month <i>Dengue Fever Modeling, its Challenges and Their Connection to Reality</i> Invited speaker
2007	Graduation Ceremony , Universidad Metropolitana, Cupey, PR Keynote speaker
Aug 2006	Joint SIAM-SMB Conference on the Life Sciences , Session: Recent Advances in Mathematical Epidemiology <i>Social contagion in drinking communities</i>
Jul 2005	SIAM Annual Meeting — Diversity Day <i>Models of Dengue Fever and their Public Health Implications</i>
Jul 2005	SIAM Annual Meeting , Session: Theoretical Biology and Dynamical Systems <i>Math-Sociology: A Drinking Behavior Model</i>
Jul 2004	SIAM Annual Meeting , Session: Dynamics in Social Networks <i>Under what conditions will drinking become established in a community?</i>
May 2004	Prevention Research Center , Berkeley, CA <i>Under what conditions will drinking become established in a community?</i>

Jul 2003	SIAM Annual Meeting , Session: Theoretical Biology and Nonlinear Dynamics <i>Models of Dengue Fever</i>
Jun 2003	Los Alamos National Laboratory Mathematical Biology Conference , Computational and Mathematical Approaches to Homeland Security, Public Health Policy and Control <i>Stability of Disease-Free and Endemic Equilibria for Models of Dengue Fever</i>
Oct 2003	Undergraduate Symposium XIV , Universidad Metropolitana, Cupey, PR Student keynote speaker
Oct 2001	Undergraduate Symposium XII , Universidad Metropolitana <i>Small World and other networks</i>

Poster presentations

Dec 2016	Latin American Congress of Probability and Mathematical Statistics , Universidad de Costa Rica, San José <i>Comparative estimation of parameters for dengue and chikungunya in Costa Rica from weekly reported data</i>
Sep 2011	Workshop for Young Researchers in Mathematical Biology , Mathematical Biosciences Institute, Columbus, Ohio <i>Possible Impact of Dengue Fever Modeling: Challenges to Public Health Officials</i>
Jul 2005	Snowbird Conference , Snowbird, Utah <i>Modeling Approaches for Drinking and Alcohol Abuse Dynamics</i>
Nov 2004	Blackwell–Tapia Conference , IPAM, UCLA <i>Modeling Approaches for Drinking and Alcohol Abuse Dynamics</i>
Jun 2003	Gordon Research Conference: Theoretical Biology & Biomathematics <i>Models for Dengue Transmission and Control</i>
Nov 2003	University of Iowa Mathematical Biology Conference <i>Models for Dengue Transmission and Control</i>
May 2003	Los Alamos National Laboratory , T-D Divisions Workshop <i>Models for Dengue Transmission and Control</i>
Sep 2001	SACNAS National Conference <i>Small World and other networks</i>
Sep 2000	SACNAS National Conference <i>Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse</i>
Jan 2001	American Mathematical Society (AMS) <i>Small World and other networks</i>
Jan 2000	American Mathematical Society (AMS) <i>Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse</i>
Oct 2000	Undergraduate Symposium XI , Universidad Metropolitana <i>Do we really have to take all our medicine?: Predicting the consequences of antibiotic misuse</i>
Oct 1999	Undergraduate Symposium X , Universidad Metropolitana <i>2D SEDFLUX</i>

PROFESSIONAL AFFILIATIONS

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

SKILLS & LANGUAGES

Programming	Python, MATLAB, C++
Operating systems	macOS, Linux, Unix, Windows
Languages	Spanish (native), English (fluent)