

## Curriculum Vitae

October 1, 18

CHETAN PRAKASH  
Independent Researcher (C. Prakash Research)  
Emeritus Professor of Mathematics

Grand Terrace, California 92313-6137

Office: (951)-743-5941  
email: chtnprksh51@gmail.com

### Higher Education

Ph. D. Applied Mathematics, Cornell University, 1982  
M.S. Applied Mathematics, Cornell University, 1979  
M.Sc. Physics, University of Delhi (St. Stephen's College), 1973  
B.Sc. Physics, University of Delhi (St. Stephen's College), 1971

### Other, Post-Secondary Education

-Senior Instructor, Aikido Schools of Ueshiba. 6th Degree black belt (received January 2015), Aikido World Headquarters, Tokyo. Practitioner of Aikido since 1983.  
-Certified Instructor, Russian Martial Art "Ryabko Systema," Systema Headquarters, Toronto 2010-2013.

### Positions at California State University, San Bernardino (1984-2018)

-Professor, Department of Mathematics,  
-Director, Center for the Study of Consciousness  
-Affiliated Faculty, CSU Intelligence Community Center of Academic Excellence  
-Instructor, Department of Physics  
-Instructor, Department of Political Science  
-Instructor, Department of Kinesiology  
-Instructor, CSUSB Extension

### Academic Positions Elsewhere

Visiting Professor, Cognitive Sciences Group (School of Social Sciences),  
University of California at Irvine, 1997-98

Visiting Associate Professor, Cognitive Sciences Group (School of Social  
Sciences), University of California at Irvine, 1992

Visiting Associate Researcher, Cognitive Sciences Group (School of Social  
Sciences), University of California at Irvine, 1989

Visiting Assistant Professor of Mathematics and Visiting Assistant Researcher,  
Cognitive Sciences Group (School of Social Sciences), University of California at  
Irvine, 1987-88

Assistant Professor, University of California at Irvine, 1983-84

Visiting Fellow, Indian Statistical Institute, 1982

Irvine Lecturer, University of California at Irvine, 1981-83

Summer Fellow and Teaching Assistant, Cornell University, 1973-81

School Monitor, Mayo College, Ajmer, India, 1967

### **Public Service**

Founder and Head Aikido Instructor, [Redlands Aikikai, a School of Meditative and Martial Arts](#) (1994-present)

Vice-President of the Executive Board, [Aikido Schools of Ueshiba](#) (member 2015-present)

Founding President of the Board, Yeru Bon Center for Indigenous Tibetan Traditions, Los Angeles (2002-2013)

### **Research Interests**

Consciousness: Mathematical Theories and Models

Cognitive Science: Theories of Perception

Mathematical Physics

Aikido: Martial and Meditative Arts

### **Publications**

#### **To Appear**

On Invention of Structure in the World: Interfaces and Conscious Agents. C. Prakash. To appear in *Foundations of Science* (Proceedings of the Symposium "Worlds of Entanglement" (2017)). Accepted September 2018.

#### **Recent**

[Conscious Agent Networks: Formal Analysis and Application to Cognition](#). *Cognitive Systems Research*. C. Fields, D. Hoffman, C. Prakash, M. Singh, accepted October 2017.

[Eigenforms, Interfaces and Holographic Encoding: Toward an Evolutionary Account of Objects and Spacetime](#). *Constructivist Foundations* vol.12 No. 3. C. Fields, D. Hoffman, C. Prakash, R. Prentner. 15 July 2017.

[The Interface Theory of Perception](#). *Psychonomics Bulletin and Review*. D. Hoffman, M. Singh, C. Prakash. September 18, 2015. DOI 10.3758/s13423-015-0890-8. Target article for special virtual edition.

[Objects of Consciousness](#). *Frontiers in Psychology: Perception Science*. D. Hoffman, C. Prakash, June 2014.

## Submitted

Why Holography? C. Fields, D. Hoffman, A. Marciano, C. Prakash, R. Prentner

Fitness Beats Truth in Evolution of Perception. C. Prakash, K. Stevens, D. Hoffman, M. Singh, C. Fields. August 2018.

## In Preparation

The likelihood of First- and Second-order Homomorphisms  
K. Chang-Barnum, D. Hoffman, C. Prakash, R. Prentner, M. Singh

Compressing Information via Geometry by Cognitive Agents. C. Prakash, D. Hoffman, K. Chang-Barnum, C. Fields.

Invention of Structure Theorems. C. Prakash, D.D. Hoffman.

Investigation of the effectiveness of penalty function constraints in the solution of hyperbolic differential equations, by Paul Silva and Chetan Prakash.

## Earlier Publications

### Book

Observer Mechanics, a Formal Theory of Perception, by Bruce Bennett, Donald Hoffman and Chetan Prakash, *Academic Press*, New York. 1989.

### Articles

A Primer on Observer Theory, Proceedings of the Varna Conference on Geometry, Integrability and Quantization, Varna, Bulgaria. C. Prakash, 2001.

Recognition of objects and detection of rigid motion using weak-perspective recognition polynomials, submitted to the *Journal of the Optical Society of America A* by Bennett, Hoffman and Prakash 1999.

Observer theory, Bayes theory, and psychophysics. In D. Knill and W. Richards (editors): *Perception as Bayesian inference*, Cambridge University Press. B. Bennett, D. Hoffman, C. Prakash, S. Richman, 1995.

-- also appears as *UCI Mathematical Behavioral Sciences Memo MBS 93-12.*

Recognition polynomials. *Journal of the Optical Society of America, A*, 10, 4, 759—764, 1993. B. Bennett, D. Hoffman, C. Prakash.

-- also appears as *UCI Mathematical Behavioral Sciences Memo*

MBS 92-17.

Unity of perception. *Cognition*, **38**, 295--334. B. Bennett, D. Hoffman, C. Prakash, 1991. -- also appears as *UCI Mathematical Behavioral Sciences Memo MBS 90-13*.

Fragment Correction of Split-Cell Error for Accurate Determination of Numbers and Size Distributions of Neuron Cell Bodies Labeled with Horse-Radish Peroxidase, submitted to *The Journal of Neurocytology*, by Yashuhiro Torigoe, Charles Bourassa, Chetan Prakash and John Swett, 1990

Structure from two orthographic views of rigid motion. *Journal of the Optical Society of America, A*, **6**, 1052--1069. B. Bennett, D. Hoffman, J. Nicola, C. Prakash, 1989.  
-- also appears as *UCI Mathematical Behavioral Sciences Memo MBS 89-01*.

Inferring structure from motion: A homotopy algorithm. *Proceedings of the IEEE Workshop on Visual Motion, Irvine*, 238--245. B. Bennett, D. Hoffman, J. Nicola, C. Prakash, 1989.

Perception and computation. *IEEE First International Conference on Computer Vision, London*, 356--364. B. Bennett, D. Hoffman, C. Prakash, 1988.

High Temperature Differentiability of the Lattice Gibbs States by Dobrushin Uniqueness Techniques, *Journal of Statistical Physics*, 31, No. 1, 1983.  
-- also title of Ph. D. thesis, Cornell University, 1981.

### **Current Grant**

Elvia & Federico Faggin Foundation AY research grant for Conscious Agent Theory, jointly with Donald Hoffman, Chris Fields and Manish Singh, April 2015 – September 2016.

### **Invited Lectures/Presentations**

"*Conscious Agents and Structure Invention.*" Invited talk at 2<sup>nd</sup> Workshop on Biological Mentality, Center for the Physics of Living Organisms Michigan Technological University, September 2018

"*Interfaces, Conscious Agents and the Invention of Structure.*" Invited talk at the online seminar: Progress and Visions in the Scientific Study of the Mind-Matter Relation, June, 2018

"*Is the world more or less as – and only as – we see it? Mathematics suggests not,*" invited talk at Science and Non-Duality, San Jose, October 2017

*"Interface Theory of Perception and Conscious Realism,"* invited talk at Worlds of Entanglement conference, Free University, Brussels (VUB), September 2017

*"Conscious Agents and the Invention of Structure in the World: Some Mathematical Theorems,"* invited conference talk at Science and Non-Duality, San Jose, October 22, 2016

*"Aikido: The Dynamic Physical Embodiment of Non-Duality,"* invited experiential session at Science and Non-Duality, San Jose, October 23, 2015

*"Conscious Agents and the Invention of Space: Two Theorems,"* invited talk at Toward a Science of Consciousness 2016, Arizona State University at Tucson, 25-3 April 2016

*"Conscious Realism: Two Theorems,"* invited conference talk at Science and Non-Duality, San Jose, October 23, 2015

*"Aikido: The Physical Embodiment of Non-Duality,"* invited experiential session at Science and Non-Duality, San Jose, October 23, 2015

*"Conscious Realism,"* talk at CSUSB Mathematics Department, October 14, 2015

*"Conscious Agent Theory: A formal theory of consciousness,"* invited talk at Toward a Science of Consciousness 2015, University of Helsinki, 9-13 June 2015

*"A Survey of Geometric Algebra,"* talk at CSUSB Mathematics Department, March 5, 2014

*"A recognition Algorithm,"* at Berkeley Math Sciences Institute, David Mumford's workshop on *"Mathematics of Imaging,"* 2005

*"Observer Theory: Statics,"* Talks at Second International Conference on Geometry, Integrability and Quantization, Varna, Bulgaria, 2001

*"Participator Dynamics,"* Talks at Second International Conference on Geometry, Integrability and Quantization, Varna, Bulgaria, 2001

*"Observer Theory, a Formal Mathematical Theory of Perception,"* U.C. Riverside, 2001

*"Probabilistic Logic and Observers,"* Talk at Institute for Mathematical Behavioral Sciences, University of California at Irvine, 1998

*"Observer Theory and Probabilistic Logics"* Talk at the Department of Mathematics, CSUSB 1998

*"The Method of Steepest Descent,"* Talk at Michael Lapidus' Mathematical physics seminar, U.C. Riverside, 1996

*"Computation and Perception,"* Talk at Office of Naval Research Contractors' Conference, Irvine 1988.

*"Rigorous Observer Theory,"* Indian Statistical Institute, Delhi, 1987.

*"Perception and Computation,"* Talk at First International Conference on Computer Vision, I.E.E.E., London, UK, 1987.

*"Observer Theory,"* Talk at Department of Mathematics, California State University, San Bernardino, 1986.

*"Observer Theory,"* Talk at Department of Mathematics, University of California, Irvine, 1986.

*"Dobrushin Uniqueness Techniques,"* statistical mechanics graduate seminar, Indian Statistical Institute, Delhi, July-August 1982.

*"Differentiability of the Pressure,"* Talk at Conference on Applications of Probability Theory, University of AZ, Tucson, 1982.

## **Honors**

National Science Talent Scholar, Government of India, 1968

Senior Biology, Chemistry and Physics prizes, Mayo College, Ajmer, India, 1968

Summer Fellowship, Cornell University, 1980

Irvine Instructor, University of California at Irvine, 1981-83

Meritorious Performance and Professional Promise Award, CSUSB, 1988-89

CSUSB Phi Beta Delta, 2005

Global Academic Excellence Professor, 14<sup>th</sup> annual International Business Summit and Research Conference, Amity University, Noida, India, 2012

## **Theses Supervised**

John Awunganyi: *"Optimization in Hilbert Space,"* 1998

Paul Silva: *"Investigation of the effectiveness of penalty function constraints in the solution of hyperbolic differential equations,"* 2000 (won award for best thesis)

Sunyoung Kim: *"Topics in the mathematics of human and machine vision,"* 2003.

Joanne Cooperus-Greene: *"Training and Preparedness in the Age of Bioterrorism,"* 2004.

Alina Birca Strzheletskaya: *"Divergent Infinite Series,"* 2005

Abraham Romero Hernandez: *"Non-Linear Dynamics and Chaos,"* 2012

Thi Nguyen: *"The Evolution of Virulence,"* 2014

### **University Service**

Director, Center for the Study of Consciousness (formerly Center for Scholarship on Spirituality):

Organized and hosted three conferences: "The Art of Peace," 2003, "Nourishing the Mind, Body and Spirit in Troubled Times: a Conference for Educators, Counselors and the General Public" (jointly with Claremont Graduate School's Center for Holistic Education) and "Spirituality and Scholarship," 2011, along with numerous lectures and workshops

Member of CSUSB Delegation, International Academic Partnership Program (Institute of International Education) Study Tour in India, November 2010

Member of CSUSB Delegation, Indus Foundation Meetings in India, November 2011

India Initiative Task Force 2010-2014

Member of Conference Organizing Committee, "Opening New Frontiers: US-India Partnerships in Higher Education," 2012

Advisor, Indian Students Association 2001-present

Advisor, Aikido Club and teacher of Aikido Club classes 1989-2010

Instructor in Aikido, Department of Kinesiology (2002-2010):

Performed numerous demonstrations and hosted numerous seminars

President, Asian Faculty Staff and Students Association 2005-06

### **University Committees:**

University Senate

Faculty Affairs Committee

WASC Accreditation Steering Committee

Graduate Education Committee

Educational Policy Committee

Library Committee

Senate Constitution & Bye-Law Review Committee

International Students' Advisory Board

Member, Examination Board for National Security Studies Master's Candidates

**Departmental Committees:** Mathematics Department

Chair, Evaluation Committee

Chair, Recruitment Committee

Chair, Part-Time Faculty Evaluation Committee

Chair, Chair Evaluation Committee

Chair, Calculus Sequence Textbook Committee

Chair Selection Committee

Mission and Goals Committee

Strategic Planning Committee  
Masters' Program in Mathematics Teaching Committee  
Mathematical Physics Courses Committee  
Graduate Committee  
Computers in Calculus Committee  
Actuarial Science Certificate Committee  
Designed new courses: Math/Physics, Advanced Topics in Analysis, Advanced Linear Algebra, Aikido (in Kinesiology) and many topics courses at both advanced undergraduate and graduate level (see below)

**College of Extended Learning**

SAT prep course instructor 1997-2006  
Aikido course instructor 1994-2005  
Co-Taught course on Tessellations

**COURSES TAUGHT AT CSUSB:**

**Department of Political Science, National Security Studies:**

[611](#) -- Operations Analysis

**Department of Kinesiology:**

[120A](#) - Combatives: Aikido

**Department of Physics:**

324 -- Statistical & Thermal Physics

**Department of Mathematics**

Graduate Seminar: Gauge Fields, Knots and Analysis  
618 -- Graduate Analysis; 616 -- Graduate Geometry; 614- Graduate Algebra; [611](#) -- Operations Analysis  
610 -- *Topics in Math*: Markov Chains; Algebraic Topology; Quantum Computing; Computer Vision; Evolutionary Dynamics

595/695 -- *Independent Study*: Clifford Algebras and Groups, Calculus of Variations; Logic and Boolean Algebras; Statistics for Actuarial Science; Group Theory and Physics; Non-Convergent Series; Non-linear Dynamics and Chaos; Mathematics of Finance; Game Theory; Mathematics of Virulence  
[576](#) -- Introduction to Mathematical Modeling; 573 -- Mathematical Methods of Physics III; [565](#) -- Mathematical Statistics; 559 -- Advanced Geometry  
557 -- Complex Variables; 555 -- Introduction to Point Set Topology  
554 -- Analysis II; 553 -- Analysis I; 546 -- Abstract Algebra II; 545 -- Abstract Algebra I; 531 -- Advanced Linear Algebra; [529](#) -- Advanced Geometry; 573 -- Mathematical Methods of Physics III; 510 -- *Topics in Math*: Advanced Linear Algebra; Applied Linear Algebra; Mathematics of Finance; Linear Programming

474 -- Numerical Analysis; 473 -- Mathematical Methods of Physics II; 470 -- Ordinary Differential Equations; [465](#) -- Probability Theory; 411 -- Mathematical Logic; 373 -- Mathematical Methods of Physics I;



[372](#) --- Combinatorics; [355](#) -- Analysis & Proof; [345](#) -- Number Theory  
[331](#) -- Linear Algebra; [329](#) -- Transformation Geometry; [305](#) -- Statistics; [320](#) --  
Interest Rate Theory; [302](#) -- Problem Solving in Mathematics; [270](#) -- Elementary  
Differential Equations; [262](#) -- Applied Statistics; [252](#) -- Multivariable Calculus II  
[251](#) -- Multivariable Calculus I ; [241](#) -- Problem-Solving in Calculus (Lab)  
[213](#) -- Calculus III [212](#) -- Calculus II; [211](#) -- Calculus I; [180](#) -- Critical Thinking Through  
Applications of Mathematical Logic; [120](#) -- Pre-Calculus Mathematics  
[115](#) -- Ideas of Mathematics; [110](#) -- College Algebra; [90](#) -- Intermediate Algebra

***Additional Mathematics Courses taught elsewhere:***

*University of California at Irvine, Departments of Cognitive Science and  
Mathematics:*

*Graduate seminars:* Rigorous Observer Mechanics, Mathematical  
Statistical Mechanics, Logic of Quantum Mechanics.

*Undergraduate courses:* Complex Analysis; Basic, Intermediate and  
Advanced Linear Algebra; Operations Research I, II and III; Others

*Indian Statistical Institute, Delhi:* Non-Differentiability of the Pressure by Dobrushin  
Uniqueness Techniques, graduate seminar



December 26, 2016 – January 1, 2017	<i>ASU Winter Intensive</i> , St. Petersburg, FL. Two classes as featured instructor
November 10-14, 2016	<i>First ASU Fall Intensive</i> , Redlands, CA. Four classes as Host Instructor
July 1-3, 2016	<i>ASU Summer Intensive</i> , Washington D.C. Two-Sword class
May 27-30, 2016	<i>Sword Intensive</i> (27 hours) at Aikido Eastside, Seattle. With George Ledyard
December 30, 2015	Class at <i>ASU Winter Intensive</i> , St. Petersburg Beach, FL
October 24, 2015	Experiential Session on <i>Aikido: The Dynamic Physical Embodiment of Non-Duality</i> at <i>Science and Non-Duality</i> conference, San Jose
April 29, 2015	Class at <i>Delhi Aikido Dojo</i> , Delhi, India
April 12, 2015	Class at <i>Cherry Blossom Seminar, Aikido Shobukan Dojo</i> , Washington DC
March 4, 2015	<i>Glendale Aikikai</i> Saturday class
August 14, 2014	Ayhan Kaya & Chetan Prakash <i>Istanbul-Redlands Friendship Seminar</i>
April 12, 2014	Class at <i>Orange County Aikikai 50<sup>th</sup> Anniversary Celebration</i> , Orange, CA
March 15, 2014	<i>"Ides of March": Knife Seminar</i>
October 25-27, 2013	<i>In Memorium, Kevin Choate Sensei</i> – Chetan Prakash & Steven Weinberg at <i>Valhalla Martial Arts, Santa Barbara, CA</i>
February 15-18 2014	<i>"Next Generation" Seminar</i> – Melissa Bell, Lee Crawford, Josh Drachman, Steve Fasen, George Ledyard and Chetan Prakash at <i>Aikido Eastside, Bellevue, WA</i>
September 28, 2013	Mark Adachi & Chetan Prakash <i>Glendale-Redlands Friendship Seminar</i>
August 2-4, 2013	<i>Tamalpais Aikido</i> (Three-day Seminar), Corte Madera, CA
June 02, 2013	<i>Spring Seminar</i>
March 16-17, 2013	<i>Celebrating 30 years in Aikido</i> (Two-day seminar): <i>Ukemi, Henka, Kaeshi</i>
December 29, 2012	Class at <i>Winter Intensive, Aikido Schools of Ueshiba</i> , St. Petersburg Beach, FL
December 09, 2012	Class at <i>Pasadena Aikikai Annual Friendship Seminar</i> , Pasadena CA
December 01, 2012	<i>Buki &amp; Te: Relationships between Sword and Empty-hand</i>
May 26, 2012	<i>Natural Movements &amp; Strikes: Atemi as Integral to Aikido</i>
April 28, 2012	<i>Kumi Tachi</i>
July 24, 2011	<i>Jo: Dori, Nage, Kumi Tachi</i>
June 11, 2011	<i>Spring Seminar</i>
October 31, 2010	<i>Sword</i>

October 23, 2010	<i>Redlands Aikikai Open House</i>
December 2009	<i>Kumi Tachi &amp; Jo-no-Tachi</i>
February 2009	<i>Tachidori, Jodori, Jonage, Two-Sword</i>
September 2008	<i>Basic &amp; Intermediate Weapons</i>
April 2008	<i>Shodan Prep</i>
January 2008	<i>Variations &amp; Free Attack</i>
December 2007	<i>Weapons Takeaways</i>
October 2007	<i>Ukemi &amp; Kaeshi Waza</i>
July 2007	<i>Henka Waza, Jiu Waza, Taninsugake</i>
April 2007	<i>Beginners</i>
February 2007	<i>Weapons &amp; Advanced Randori</i>
January 2007	<i>Test Prep</i>
June 2006	<i>Weapons</i>
April 2006	<i>Test Prep</i>
January 2006	<i>Randori</i>