

# *CURRICULUM VITAE*

MARIA ISABEL BUENO CACHADINA

Office address : Department of Mathematics,  
University of California,  
Santa Barbara, CA, 93116.

Phone : (805)8935245

## **EDUCATION**

1. Ph.D in Mathematics, Universidad Carlos III de Madrid, Madrid (Spain). June, 2004.
2. Bachelor's degree in Education (Certificado de aptitud pedagógica). Universidad Complutense de Madrid (Spain), 2002. In Spain, this certificate qualifies to teach at high-school level.
3. Graduate certification on Internet distance learning. Universidad de Murcia, Spain, 2000.
4. Master in Finance. Universidad Privada de Santa Cruz de la Sierra, Santa Cruz de la Sierra (Bolivia). 1997.
5. Bachelor's degree in Mathematics. (Licenciada en Matemáticas), Universidad Complutense de Madrid, Spain, 1989.

## AWARDS, FELLOWSHIPS AND GRANTS

- 2017 AWM - NSF Travel Grant \$1600.  
2015 Mochizuki Memorial Fund Award for outstanding achievement in Mathematics instruction.  
2014 – 2017 NSF grant for an REU site \$ 350,000  
2013 Academic Senate Distinguished Teaching Award  
2012 Dolciani grant(\$3,000+\$6,000 matching funds)  
2010 MAA Tensor-grant(\$4000+\$4000 matching funds)  
2009 – 2012 NSF grant for an REU site. \$ 305,000  
2009 Faculty Career Development Award. UCSB. \$7500  
2008 – 2009 MAA Tensor-grant(\$5000+\$5000 matching funds)  
2008 Faculty Career Development Award. UCSB. \$6500  
2007 – 2009 Grant MTM2006-06671 from Dirección General de Investigación Ministerio de Educación y Ciencia of Spain (\$53000)  
2007 – 2008 MAA Tensor-grant(\$3000+\$5000 matching funds)  
2007 AWM-NSF Travel Grant \$1818.  
2005 – 2007 Postdoctoral fellowship. Ministerio de Educacion y Ciencia de España.  
2003 – 2006 Grant BFM 2003-06335-C03-02 from Dirección General de Investigación (Ministerio de Educacion y Ciencia) of Spain. This grant covers travel expenses.  
2000 – 2001 Research fellowship. Universidad Carlos III de Madrid.

## ACADEMIC POSITIONS

- 2016– Senior Lecturer  
The university of California, Santa Barbara.  
2010 – 2016 Lecturer SOE  
The university of California, Santa Barbara.  
2006 – 2010 Lecturer PSOE  
The university of California, Santa Barbara.  
2005 – 2006 Postdoctoral fellowship paid by Spanish Government at  
The College of William and Mary.  
2004 – 2005 Visiting assistant professor, The College of William and Mary, VA, USA.  
2002 – 2004 Instructor, Universidad Carlos III de Madrid, Spain.  
1994 – 2000 Professor, Universidad Privada de Santa Cruz de la Sierra, Bolivia.  
1993 – 1994 Instructor, Universidad Nur, Bolivia.  
1992 – 1993 High-school teacher, Colegio La Salle, Bolivia.  
1991 – 1992 High-school teacher, INB Fuenlabrada VIII, Spain.  
1990 – 1991 High-school teacher, IFP Enrique Tierno Galván, Spain.  
1989 – 1990 High-school teacher, INB Mostoles VIII, Spain.

## PUBLICATIONS

1. Refereed publications.

1. *Continuous symmetric Sobolev inner products*, Intern. Math. Journal, 3 (2003), pp. 319-342. Joint work with F. Marcellán.
2. *Darboux transformation and perturbation of linear functionals*. Linear Algebra and Applications, 384(2004) 215-242. Joint work with F. Marcellán.
3. *Discrete-continuous symmetrized Sobolev inner products*. Acta Apl. Mat., 82(2004) 309-331. Joint work with K. H. Kwon and F. Marcellán.
4. *Stability and sensitivity of Darboux transformation without pivoting*. ETNA, 18(2004) 101-136. Joint work with F. M. Dopico.
5. *Stability and sensitivity of tridiagonal LU factorization without pivoting*. BIT, 44(2004), 651-673. Joint work with F. M. Dopico.
6. *Continuous symmetric Sobolev inner products of order  $N$  (I)*. Journal of Mathematical Analysis and Applications, 306(2005) 83-96. Joint work with F. Marcellán y J. Sánchez-Ruiz.
7. *Polynomial perturbations of bilinear functionals and Hessenberg matrices*. Linear Algebra and Applications, 414(2006), 64-83. Joint work with F. Marcellán.
8. *Continuous symmetric Sobolev inner products of order  $N$  (II)*. ETNA, 24(2006), 55-65. Joint work with F. Marcellán and J. Sánchez-Ruiz.
9. *A more accurate algorithm for computing Christoffel transformation*. Joint work with F. M. Dopico. Journal of Comp. and Appl. Math., 205(2007), 567-582 .
10. *Numerical properties of shifted tridiagonal LU factorizations*. Joint work with C. Brittin. Mediterranean Journal of Mathematics, 4(2007), 275-288.
11. *Congruence of Hermitian matrices by Hermitian matrices*. Joint work with S. Furtado and C.R. Johnson. Linear Algebra and Applications, 425(2007), 63-76.
12. *Minimum deviation, quasi-LU factorization of nonsingular matrices*. Joint work with C. R. Johnson. Linear Algebra and its Applications, 427(2007), 99-118.
13. *On the exponent of  $r$ -regular primitive matrices*. Elect. Journal of Linear Algebra 17(2008), 28-47. Joint work with S. Furtado.
14. *Maximum exponent of boolean circulant matrices with constant number of nonzero entries in its generating vector*. Electronic Journal of Combinatorics 16(2009), no. 1, Research Paper 66. Joint work with S. Furtado and N. Sherer.
15. *An algorithm for computing the Geronimus transformation with large shifts*. Numerical Algorithms, 54(2010), 101-139. Joint work with A. Deano and E. Tavernetti.
16. *On the Gaps in the Set of Exponents of Boolean Primitive Circulant Matrices*. Electr. Journal of Linear Algebra 20 (2010), 640-660. Joint work with S. Furtado.

17. *Recovery of eigenvectors and minimal bases of matrix polynomials from generalized Fiedler linearizations.* Joint work with F. De Teran Vergara and F. M. Dopico. SIAM. J. Matrix. Anal. & Appl. 32 (2011), pp 463-483.
18. *Distribution of the exponents of primitive circulant matrices in the first four boxes of  $\mathbb{Z}_n$ .* Joint work with K. Fang, S. Fuller and S. Furtado. Involve 5(2012), 187-205.
19. *T-palindromic linearizations of a matrix polynomial of odd degree obtained from Fiedler pencils with repetition.* Joint work with S. Furtado. Electr. Journal of Linear Algebra, 23 (2012), pp. 562-577.
20. *Eigenvectors and minimal bases for some families of Fiedler-like linearizations.* Joint work with F. De Teran. Linear and Multilinear Algebra, 62, no. 1 (2014), 39-62.
21. *Structured linearizations from Fiedler pencils with repetition I.* Joint work with K. Curlett and S. Furtado. Linear Algebra and its applications, 460 (2014) 51-80.
22. *Structured linearizations from Fiedler pencils with repetition II.* Joint work with S. Furtado. Linear Algebra and its applications, 463 (2014) 282-321.
23. *The kernel of the matrix  $i \cdot j \bmod n$ , when  $n$  is prime.* Joint work with S. Furtado, J. Karkoska, K. Mayfield, R. Samalis, and A. Telatovich. Involve, 9-2 (2016), 265–280.
24. *Large vector spaces of block-symmetric structured strong linearizations.* Joint work with F.M. Dopico, S. Furtado, and M. Rychnovsky. Linear Algebra and its applications, 477 (2015), 165-210.
25. *Linearizations of Hermitian matrix polynomials preserving the sign characteristic.* Joint work with F.M. Dopico and S. Furtado. SIAM Journal of Matrix Analysis, 38 (2017), 249–272.
26. *On the sign characteristic of Hermitian linearizations in  $\mathbb{DL}(P)$ ,* Joint work with J. Breen, S. Ford, and S. Furtado. Linear Algebra and its Appl. 519 (2017), 73-101.
27. *A unified approach to Fiedler-like pencils via strong minimal bases pencils,* Joint work with F. M. Dopico, J. Perez, F. Saavedra, B. Zykoski. Submitted.

## 2. Books written

- *Con un poco de lógica. Introducción a la lógica y teoría de conjuntos.* (With some logic. Introduction to Logic and Set Theory). Published by Universidad Privada de Santa Cruz de la Sierra. Santa Cruz de la Sierra, Bolivia, 1995.

## 3. Articles published in non-refereed conference proceedings

- *Learning linear algebra with MATLAB,* First International Meeting on teaching of mathematics assisted by computers. Costa Rica, 1999.

#### 4. Unrefereed publications not listed above

- *Systems of linear equations: a problem of local knowledge*. Revista Ecociencia. Vol. II, 3(2000).

#### 5. Invited talks

- *Linearizations of Hermitian Matrix Polynomials Preserving the Sign Characteristic*, SIAM Conference on Applied Linear Algebra, Atlanta, Georgia, October 2015.
- *On the exponent of  $r$ -regular primitive matrices*, 14th Conference of the International Linear Algebra Society, ILAS 07, University of Shanghai, Shanghai, China, July 16-20, 2007.
- *Minimum deviation quasi-LU factorizations*, 2nd International Workshop on Matrix Analysis and Applications, Nova Southeastern University, Fort Lauderdale, Florida, Dec. 15-17, 2006.
- *Darboux transformation with shift: Stability and sensitivity analysis*, Foundations of Computational Mathematics 2005, Universidad de Cantabria (Spain). July, 2005.
- *A forward stable algorithm for computing Jacobi matrices*, The College of William and Mary, Williamsburg, VA, Oct., 2005.
- *Darboux transformation and orthogonal polynomials: Matrix interpretation and numerical aspects*, Kent State University, Kent, OH. March, 2005.
- *Polynomial perturbations of bilinear functionals and Hessenberg matrices*, The College of William and Mary, Williamsburg, VA, Sept. 2004.

#### 6. Contributed scholarly papers and talks

- *Symmetric Fiedler pencils with repetition as linearizations of symmetric matrix polynomials*, 18th Conference of the International Linear Algebra Society, ILAS 13. Providence, RI, June 2013.
- *Recovery of eigenvectors of matrix polynomials from generalized Fiedler linearizations*, 4rd Southern California Women in Math Symposium. Loyola Marymount University, January 2012.
- *Recovery of eigenvectors of matrix polynomials from generalized Fiedler linearizations*, 17th Conference of the International Linear Algebra Society, ILAS 11, Braunschweig, Germany, August 2011.
- *Recovery of eigenvectors of matrix polynomials from generalized Fiedler linearizations*, 3rd Southern California Women in Math Symposium. Pomona College, Claremont, November 2010.
- *On the set of exponents of Boolean primitive circulant matrices*, 16th Conference of the International Linear Algebra Society, ILAS 10, Pisa, Italy, June, 2010.

- *Maximum exponent of boolean circulant matrices with constant number of nonzero entries in its generating vector*, 2nd Southern California Women in Math Symposium. University of Southern California, Los Angeles, 2010.
- *A new algorithm for computing a Darboux transformation with large shifts*, SIAM conference on Applied Linear Algebra 2009, Monterey, October, 2009.
- *Algorithms for computing the Geronimus transformation*, 15th Conference of the International Linear Algebra Society, ILAS 08, Cancun, Mexico, June 16-20, 2008.
- *The quasi-LU factorization with minimum excess*, Southern California Matrix Meeting 2004, San Jose State University, San Jose, California (USA). November, 2004.
- *Perturbation of bilinear functionals and Hessenberg matrices*, International workshop on orthogonal polynomials: "Orthogonal polynomials and mathematical physics", Leganes- Madrid (Spain). June, 2004.
- *Continuous symmetric Sobolev inner products*, Seventh International Symposium on orthogonal polynomials, special functions and applications. Copenhagen, Denmark. August, 2003.
- *Stability of an algorithm for computing Jacobi matrices*, ETNA's 10th anniversary: Following the Flows of Numerical Analysis", Kent, Ohio, May, 2003.
- *Symmetrization and Sobolev inner products*, International Workshop on Orthogonal Polynomials: Orthogonal Polynomials and Approximation Theory", Leganes, Spain, June, 2002.
- *A methodological layout for the teaching of systems of linear equations*, II Jornadas de Matemática Educativa e Investigación. Santa Cruz de la Sierra, Bolivia, 2000.
- *Learning linear algebra with MATLAB*, I Congreso Internacional de enseñanza de la matemática asistida por computadora. Cartago, Costa Rica, 1999.
- *Mathematics for reliability*, V congreso boliviano de matemática, Cochabamba, Bolivia, 1998.
- *The computer and graphical methods for the resolution of algebraic problems*, IV congreso de Educación matemática, Santa Cruz de la Sierra, Bolivia, 1998.

## TEACHING EXPERIENCE

1. Undergraduate courses taught at University level.

- 2016 – 2017 Introduction to Higher Mathematics, Linear Algebra I and II, Multidimensional Analysis II, History of Mathematics, Special Topics for Transfer Students  
*University of California, Santa Barbara.*
- 2015 – 2016 Introduction to Higher Mathematics, Linear Algebra I and II, History of Mathematics, Problem Solving I and II  
*University of California, Santa Barbara.*
- 2014 – 2015 Advanced Linear Algebra, History of Mathematics, Operations Research, Multidimensional Analysis: Differentiation  
*University of California, Santa Barbara.*
- 2013 – 2014 Linear Algebra, Solving problems in Combinatorics, History of Mathematics, Problem-Solving seminar, Multidimensional Analysis: Differentiation  
*University of California, Santa Barbara.*
- 2012 – 2013 Linear Algebra, Problem-Solving, Operations Research, Multidime. Analysis, Combinatorics, Introduction to research seminar,  
*University of California, Santa Barbara.*
- 2011 – 2012 Linear Algebra, Problem-Solving, Operations Research, Multidim. Analysis, Combinatorics, Reading Club,  
*University of California, Santa Barbara.*
- 2010 – 2011 Linear Algebra, Problem-Solving, Operations Research, Combinatorics, Introduction to research seminar,  
*University of California, Santa Barbara.*
- 2009 – 2010 Linear Algebra, Problem-Solving, Honors Seminar, Vector Calculus  
*The University of California at Santa Barbara, USA*
- 2008 – 2009 Linear Algebra, Problem-solving, Vector Calculus, Differential Equations.  
*The University of California at Santa Barbara, USA*
- 2007 – 2008 Linear Algebra, Problem-solving, Differential equations, Vector Calculus.  
*The University of California at Santa Barbara, USA*
- 2006 – 2007 Linear Algebra, Algebra and Geometry, Graph Theory, Problem-solving, Abstract Algebra.  
*The university of California at Santa Barbara, USA*
- 2004 – 2005 Linear Algebra, Abstract Algebra.  
*The College of William & Mary, USA*
- 2001 – 2004 Labs with MATLAB for Numerical Calculus, Calculus, Calculus II, Linear Algebra, and Numerical Linear Algebra  
*Universidad Carlos III de Madrid, Spain.*
- 1994 – 2000 Introduction to mathematics, Algebra, Calculus, Linear algebra and Discrete mathematics  
*Universidad Privada de Santa Cruz de la Sierra, Bolivia.*
- 1993 – 1994 Linear algebra and algebra for economists  
*Universidad Nur, Bolivia.*

2. Training of high school teachers.

I gave ten courses between 1995 and 2000 in the following topics: “Functions as mathematical models”, “Linear equations and linear systems of equations”, “System

of real numbers and Set Theory”, “Logic and applications in teaching Mathematics”, “Elements of Algebra”, “Preparation and evaluation of quizzes”, “Development of high order intellectual skills in Mathematics”.

## **PARTICIPATION IN SCIENTIFIC EVENTS**

In addition to the conferences where I gave a talk, I attended several more scientific events.

## **PROFESSIONAL SERVICE**

### 1. Professional Service Activities

- UCSB representative in BOARS.
- Chair of CAERS (Committee on Admissions, Enrollment and Relations with Schools.) (2015-2017)
- Program chair of the CCS math program (2007-2014, 2015-2016)
- Director of the UCSB Math Circle (2009-2015)
- Chair of the CCS Math Steering Committee (2010-2011)
- Chair of the Promoting CCS Committee (2009-2010)
- Secretary of the CCS Executive Committee (2008-2014)
- Member of the undergraduate committee (Mathematics Department) (2014-2017)
- Member of the Distinguished Teaching Awards committee (2015)
- Member of the CCS SURF selection committee (2014-2017)
- Member of the committee to re-establish a connection between the Senate and Extension (2015)
- Member of the committee on Admissions, Enrollment, and Relations with Schools (CAERS) (2013-2015).
- Member of the Regents Scholarship Committee (2011-2016).
- Member of the Faculty Legislature Committee (2007-2012).
- Member of the College of Creative Studies Executive Committee. (2007-2014)
- Member of the Committee for Faculty Diversity at UCSB.(2006-2008,2011-2013)
- Referee for
  - Journal on Numerical Linear Algebra and Applications.
  - Journal of Scientific Computing.
  - SIAM Journal on Matrix Analysis and Applications.



- Numerical algorithms.
- Journal of Computational and Applied Mathematics.
- Linear Algebra and Its Applications.
- Ars Combinatoria.
- Illinois Journal of Mathematics.
- Graphs and Combinatorics.
- Director of the UCSB Mathematics Summer Research Program (2010-2012, 2014-2017).
- Organizer of the Summer Research Program for Undergraduates in Applied Mathematics at the University of California at Santa Barbara. Summer, 2007.
- Colaborator of the organizing committee of the International Workshop on Orthogonal polynomials, Leganés (Madrid), July, 2004.
- Member of the organizing committee (secretary) of the Summer School on Orthogonal Polynomials and Special Functions. Recent trends in computation and applications. Leganés, (Madrid), July, 2004.
- Member of the organizing committee of International Workshop on Numerical Linear Algebra. Recent Trends in Numerical Linear Algebra. Leganés (Madrid), June, 2003.
- Chairperson, Department of Mathematics, Universidad Privada de Santa Cruz de la Sierra, Bolivia. 1996-2000.
- Organizer of the II Workshop on Mathematics, Education and Research. Universidad Privada de Santa Cruz de la Sierra, Bolivia, 2000.
- Responsible of the Euclides Program for the improvement of the learning-teaching process in the Universidad Privada de Santa Cruz de la Sierra, 1999-2000.
- Head of the academic committee in the self-study process of the Universidad Privada de Santa Cruz de la Sierra. Red latinoamericana de cooperación universitaria, 1999.
- Coordinator of the I Workshop on Mathematics, Education and Research. Universidad Privada de Santa Cruz de la Sierra, Bolivia, 1998.
- Academic coordinator of the graduate course: Master in foundations of mathematics, 1998.
- Head of the academic committee in the process of self-study of the Universidad Privada de Santa Cruz de la Sierra. CINDA, 1996

## LANGUAGES

- Proficient in written and spoken English.
- Spanish (native language).

## COMPUTER SKILLS

- MATLAB: expert level.
- MAPLE: user level.
- System manager of the Mathematics Department Web page. 2001-2004.