

**Éva Czabarka**  
**Resume**  
July 2011

**Address:** Department of Mathematics  
University of South Carolina  
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**Degrees:**

- 1998 Ph.D. in Mathematics, University of South Carolina, Columbia.  
*Shifting Technique in Finite Vector Spaces*. Thesis advisor: Jerrold Griggs.
- 1991 equivalent of M.S. in Mathematics, József Attila University, Szeged, Hungary.  
*Bin Packing Algorithms*. Thesis advisor: Gábor Galambos)

**Other education:**

- Fall 2003 Nonparametric Statistics course at the Foundation for Advanced Education in the Sciences Graduate School at the National Institutes of Health (NIH)
- Oct 2001 Computational Genomics course at Cold Spring Harbor Laboratory, Cold Spring Harbor.
- Fall 2000 Evolutionary Biology course at FAES Graduate School at NIH
- 1998-1999 M.S. studies in Statistics at the University of South Carolina, Columbia (coursework only).
- 1988-1990 Member of the Eötvös Kollégium (Honors College) of József Attila University, Szeged, Hungary.

**Work Experience:**

- 2006-now Tenure Track Assistant Professor at the University of South Carolina, Columbia, SC
- 2004-2006 Tenure Track Assistant Professor Department of Mathematics, College of William & Mary, Williamsburg, VA
- 2001-2004 Research Fellow at the National Center for Biotechnology Information (NCBI), National Library of Medicine (NLM), National Institutes of Health, Bethesda, MD.
- 2000-2001 Visiting Fellow at NCBI, NLM, NIH, Bethesda, MD.
- 1991-2000 Graduate Teaching Assistant at the Department of Mathematics, University of South Carolina, Columbia.
- Aug 1996 Internship at Mosaic Computing Incorporated, Columbia, SC.

**Research Support (grants, fellowships):**

1. 2010-2011 Extremal combinatorics and biological applications of combinatorics: Promising Investigator Research Award, Track 1, Office of Research and Graduate Education, University of South Carolina \$15,632
2. Hungarian Bioinformatics: Marie Curie Fellowships at the Rényi Institute of Mathematics of the Hungarian Academy of Sciences 2007-2010 (2 month in each summer, a total of 8 month) approx \$45,000
3. Administrative Supplement: Phylogenetic Analysis with Complex Genome Rearrangement Events (2009-2010) by NIH NIGMS 3 R01 GM078991-03S1, co-I, PI: J. Tang (USC CSE), co-I's: L.A. Székely (USC Math) and T.J. Vision (UNC Biology) \$89,000
4. Travel grants to:
  - (a) Hypergraph Turán Workshop, American Institute of Mathematics, Palo Alto, California, March 2011
  - (b) Babai is 60 Conference, Ohio State University, Columbus, Ohio, March 2010
  - (c) Trotter is 65 Conference, Georgia Tech, Atlanta, May 2008

### Dates of Longer Research Visits without Employment:

|                   |   |
|-------------------|---|
| June 2011         | 14 days in UK at the University of East Anglia, Norwich, and at the Isaac Newton Institute, University of Cambridge |
| Dec 2010          | 1 month at the Bioinformatics Research Centre, University of Canterbury, NZ   |
| Sep-Nov 2010      | 3 months at the Institut für Diskrete Mathematik in Bonn, Germany   |
| Dec 2007-Jan 2008 | 3 weeks in South Africa, University of Kwa-Zulu Natal and Stellenbosch University                                   |
| May-June 2006     | 1 month at the Department of Computer Science, Loughborough University, UK  |
| May-June 2005     | 1 month at the Department of Computer Science, Loughborough University, UK  |
| May-June 2004     | 1 month at the Department of Computer Science, Loughborough University, UK  |

### Short Research Visits (without a talk):

|           |   |
|-----------|---|
| Oct 2010  | 4 days at Technische Universität Braunschweig, Germany                            |
| Aug 2010  | 5 days at the Institute of Mathematics, Slovakian Academy of Sciences, Bratislava |
| July 2010 | 1 week at the University of Maribor, Slovenia                                     |
| May 2010  | 3 days at the Institute of Mathematical Biosciences, Columbus, Ohio               |
| July 2009 | 5 days at the Institute of Mathematics, Slovakian Academy of Sciences, Bratislava |
| July 2008 | 3 days at the Institute of Mathematics, Slovakian Academy of Sciences, Bratislava |
| June 2007 | 2 days at the National Evolutionary Synthesis Center, Durham, NC                  |

### Awards:

|      |  |
|------|--|
| 2008 | Two Thumbs Up Award (student nominated award given by the USC's Student Disability Services) |
| 2004 | Performance Bonus Award for year 2003 at NCBI  |
| 2003 | Performance Bonus Award for year 2002 at NCBI.   |
| 2002 | Performance Bonus Award for year 2001 at NCBI.   |

### Teaching Experience:

Courses taught include:

- Basic College Mathematics
- Precalculus Mathematics
- Calculus for Business Adm. & Social Sciences
- Finite Mathematics
- Discrete Mathematics for Computer Science
- Basic Concepts of Elementary Mathematics
- Elementary Probability and Statistics
- Advanced Applied Statistics
- Foundations of Mathematics (major course)
- Vector Calculus
- Calculus I
- Differential Equations
- Transition to Advanced Mathematics
- Abstract Algebra (major course)
- Discrete Mathematics (major course)
- Discrete Mathematics I (Ph.D. course)
- Discrete Mathematics II (Ph.D. course)

Participated in teaching preparatory seminars for the National Teacher's Examination (NTE) and had been invited to give talks at the Euclidean Club to a mixed audience of faculty and students at the Department of Mathematics and Computer Science of South Carolina State University, Orangeburg. Has been cited by at least one graduate of the University of South Carolina as a teacher who significantly contributed to his success. Individual work with a talented undergraduate at the College of William & Mary

### Graduate Students:

#### Ph.D. students:

- Virginia Johnson (expected to graduate in 2012)
- Mojca Bračič, University of Maribor, Slovenia co-advising with Drago Bokal

#### M.S. students:

- Kevin Hathcock (expected to graduate in 2012)
- Tatiana Orlova, Aug 2010, *Mathematical models, algorithms and statistics of sequence alignment*
- Charles Cavalier, Aug 2009, *Graceful labelings*
- Ivan Haynes, Dec 2008, *Analysis of generalized Sudoku puzzles: A mixture of discrete techniques*

## Publications:

1. É. Czabarka, L.A. Székely, T.J. Vision, Minimizing the number of episodes on species trees — an extension of Gallai's theorem on intervals (in preparation)
2. H. Aydinian, É. Czabarka, L.A. Székely,  $k$ -dimensional transversals and simple mixed orthogonal arrays (in preparation)
3. Cs. Bíró, É. Czabarka, P. Dankelmann, L.A. Székely: Two remarks on the domination number of graphs (submitted)
4. É. Czabarka, P.L. Erdős, V. Johnson, V. Moulton: Counting multi-labeled phylogenetic trees using generating functions (submitted)
5. É. Czabarka, P. L. Erdős, V. Johnson, A. Kupczok, L.A. Székely, Asymptotically normal distribution of some tree families relevant for phylogenetics and of partitions without singletons, (submitted)
6. H. Aydinian, É. Czabarka, P. L. Erdős, L.A. Székely, A tour of  $M$ -part  $L$ -Sperner families, JCT A, 118 (2011) 702–725
7. H. Aydinian, É. Czabarka, K. Engel, P.L. Erdős, L.A. Székely, A note on full transversals and mixed orthogonal arrays, Australasian J. Combin. 48 (2010) 133–141
8. D. Bokal, É. Czabarka, L.A. Székely, I. Vrřo, General lower bounds for the minor crossing number of graphs, Discrete and Computational Geometry 44 (2010) 463–483
9. É. Czabarka, L.A. Székely, S. Wagner, The inverse problem for certain tree parameters, Discrete Applied Math 157 (15) (2009) 3314–3319
10. É. Czabarka, P. Dankelmann, L.A. Székely, Diameter of 4-colourable graphs, European J. of Combin. 30 (2009) 1082–1098
11. É. Czabarka, O. Sýkora, L.A. Székely, I. Vrřo, Biplanar crossing numbers. II. Comparing crossing numbers and biplanar crossing numbers using the probabilistic method. Random Structures and Algorithms 33 (4) (2008 Dec) 480–496
12. D. Bokal, É. Czabarka, L.A. Székely, I. Vrřo, Graph minors and the crossing number of graphs, Electronic Notes in Discrete Math. 28 (2007) 169–175
13. É. Czabarka, O. Sýkora, L. A. Székely and I. Vrřo, Crossing numbers and biplanar crossing numbers I: a survey of problems and results, More Sets, Graphs and Numbers, eds. E. Győri, G. O. H. Katona and L. Lovász, Bolyai Society Mathematical Studies 15, Springer Verlag, (2006) 57–77.
14. J.L. Spouge, É. Czabarka, Some central limit theorems pertinent to the effectiveness of database retrieval, Technical Reports of the Industrial Mathematics Institute, Department of Mathematics, University of South Carolina, <http://imi.cas.sc.edu/IMI/resources/technical-reports/2006/reports/0615.pdf>
15. É. Czabarka, O. Sýkora, L.A. Székely, I. Vrřo, Outerplanar crossing numbers, circular arrangement problem, and isoperimetric functions, Electronic Journal of Combinatorics 11(1), (2004) R81 20pp
16. G.T. Marth, É. Czabarka, J. Murvai, S.T. Sherry, The allele frequency spectrum in genome-wide human variation data reveals signals of differential demographic history in three large world populations. Genetics 166 (2004) 351–372
17. G.T. Marth, G. Schuler, R. Yeh, R. Davenport, R. Agarwala, D. Church, S. Wheelan, J. Baker, M. Ward, M. Kholodov, L. Phan, É. Czabarka, J. Murvai, D. Cutler, S. Wooding, A. Rogers, A. Chakravarty, H.C. Harpending, P.-Y. Kwok, S.T. Sherry, Sequence variations in the public human genome data reflect a bottlenecked population history, Proc. Natl. Acad. Sci. USA (2003) 100: 376–381.

18. I.B. Rogozin, K.S. Makarova, J. Murvai, É. Czabarka, Y.I. Wolf, R.L. Tatusov, L.A. Székely, E.V. Koonin, Connected gene neighborhoods in prokaryotic genomes. *Nucleic Acids Res.*; 30(10) (2002 May) 2212-23.
19. É. Czabarka, G. Konjedov, M. V. Marathe, A.G. Percus, D.C. Torney, Algorithms for Optimizing Production DNA Sequencing, Proceedings of the Eleventh Annual ACM-SIAM Symposium on Discrete Algorithms (SODA00) 399-408.
20. É. Czabarka, Intersecting Chains in Finite Vector Spaces, *Combinatorics, Probability and Computing* 8, (1999), 509-528.
21. S. Visvanathan, É. Czabarka, A. Sengupta: Fault-Tolerant Embedding of Hamiltonian Circuits in Line Digraph Interconnection Networks, *Information Processing Letters* 57, (1996), 265-271

**Invited seminar talks: (talks given at place of employment not included)**

1. Dept. of Computer Science, University of Alberta, Canada, *From M-part Sperner theorems to mixed orthogonal arrays*, Aug 17-20, 2011
2. NIH, NLM, NCBI, *Structural results on gene trees and species trees*, July 2011
3. University of Szeged Combinatorics Seminar, *Graph orientations and crossing numbers*, June 27 2011
4. Biomathematics Research Centre, *Some results on gene trees and phylogenetic trees*, University of Canterbury, NZ, Dec 19
5. Technische Universität Berlin, Dept. of Math, *More part Sperner families*, Nov 19, 2010
6. University of Maribor, Dept. of Math, *Analogues of crossing numbers*, Oct 18, 2010
7. University of Szeged, Combinatorics Seminar, *M-part Sperner families*, Aug 27, 2010
8. University of Southern Georgia, Dept. of Math, *Models for bootstrapping in database retrieval*, Oct 16, 2008.
9. Stellenbosch University, South Africa, *What does database bootstrapping mimic?*, January 6, 2008
10. University of Kwa-Zulu Natal, Durban, South Africa, *Crossing numbers and minor crossing numbers*, January 10, 2008.
11. University of Alabama at Birmingham, *Modeling evaluation of database retrieval*, Sept. 7, 2007.
12. Rényi Institute of Mathematics of the Hungarian Academy of Sciences, Budapest, Hungary, *A model for database bootstrap* (in Hungarian), May 2007.
13. SZTAKI (Computer Science Research Institute of the Hungarian Academy of Sciences), Budapest, Hungary, *Justifying database bootstrapping* (in Hungarian) May 2007.
14. Department of Computer Science, University of Edmonton, *Bootstrapping the  $ROC_n$*  Oct 2006:
15. Department of Computer & Information Sciences & Engineering, University of Florida, *Bootstrapping the  $ROC_n$* , Oct 2006
16. Department of Mathematics, University of South Carolina, *Bootstrapping the  $ROC_n$*  March 2 2006
17. Department of Mathematics, College of William & Mary, *Comparing the efficiency of database retrieval methods* May 3, 2004
18. Virginia Polytechnic Institute and State University, Department of Computer Science, *Analysis of allele frequency spectrum in human variation data*, April 19, 2004

19. Department of Mathematics, San Jose State University, San Jose, CA, *Comparing the efficiency of database retrieval methods*, March 4, 2004
20. Department of Mathematics, Georgetown University, Washington DC, *Comparing the efficiency of database retrieval methods*, Feb. 24 2004
21. Bioinformatics Seminar of the Department of Computer Science, University of South Carolina, Columbia, *Which algorithm to choose?*, January 23 2004
22. Joint colloquium of the Departments of Mathematics/Computer Science, Biology and Chemistry, Valparaiso University, Valparaiso, IN, *Which algorithm to choose?* Nov. 10 2003
23. Virginia Polytechnic Institute and State University, Computer Science Department, *Comparing the efficiency of database retrieval methods* March 19, 2003
24. Genetics Discussion Group of the University of South Carolina, Columbia, SC, *Sequence alignment and accuracy of database retrieval* May 30, 2001
25. Departments of Mathematics and Computer Science, Gettysburg, PA, *Sequence alignment, protein structure matching and the Chen-Stein method*, April 19, 2001
26. NIH, NLM, National Center for Biotechnology Information, *Shifting in Finite Vector Spaces*, Nov 23, 1998

**Invited Conference Talks:**

1. Fall Southeastern Sectional Meeting of the AMS, Wake Forest , University in Winston-Salem, *Graph orientations and crossing numbers*, North Carolina, Sept 24-25, 2011
2. Crossing Numbers Turn Useful, Banff International Research Station, Canada, *Crossing number lower bounds and orientations*, Aug 20-26 2011
3. Phylogenetics: New data, new Phylogenetic challenges, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK *Generalized Stirling numbers and distribution of phylogenetic trees*, June 20-24, 2011 (20 min)
4. Midsummer Phylogenetics at University of East Anglia, UK, *Optimal placement of multiplication events on a species tree*, June 17, 2011
5. SIAM SEAS 2011, UNC Charlotte, *Extremal questions on  $d$ -dimensional transversals in  $M$ -dimensional grids*, March 25-26, 2011 (25 min)
6. 2011 Southeastern Sectional Meeting of AMS, Statesboro, GA *Higher dimensional transversals in  $M$ -dimensional grids*, March 12-13, 2011 (25 min)
7. Search Methodologies II, Zentrum fr Interdisziplinre Forschung, *Full transversals and mixed orthogonal arrays* Oct 25-29, 2010 (30 min)
8. 2010 Fall Eastern Sectional Meeting?Syracuse, NY, *Some combinatorial results on gene trees*, October 2-3, 2010 (20 min),
9. Workshop on Theory and Algorithmic Aspects of Graph Crossing Number, Brno, Czech Republik, *Analogues of crossing numbers*, Aug 21-22 2010 (20 min)
10. 2009 Molecular Informatics and Bioinformatics International Symposium, Institute of Advanced Studies, Budapest, Hungary *Minimizing the number of episodes on a species tree — an extension of Gallai's theorem on intervals* March 17-19 2009 (30 min)
11. SIAM Discrete Mathematics biannual meeting, Burlington, Vermont *Minor crossing numbers*, 2008 (30 min)
12. International Conference on Interdisciplinary Mathematical and Statistical Techniques (IMST 2008/FIM XVI), Memphis, *The diameter of 4-colorable graphs*, May 2008 (30 min)

13. Sectional AMS Meeting, Special Session on Extremal and Probabilistic Combinatorics, DePaul University, Chicago, *M-part L-Sperner families*, Oct. 5-6, 2007 (30 min)
14. 6<sup>th</sup> Slovenian International Conference on Graph Theory, Minisymposium on Crossing Numbers of Graphs, *Minor crossing number and crossing number of graphs*, June 2007 (30 min)
15. Ondrej Sýkora Memorial Theory Day, Loughborough University, Loughborough, UK, *What does bootstrapping mimic?* June 2006: (20 min)
16. PARADAY V, PÁRC, Dept. of Computer Science, Loughborough University, Loughborough, UK, *Bootstrapping the  $ROC_n$  in database retrieval* May 24 2004 (30 min)
17. PÁRC Mini-symposium, Parallel Algorithms and Architecture Research Centre, Department of Computer Science, Loughborough University, Loughborough, UK, *Sequence alignment algorithms* June 18 2002: (60 min)
18. 2001 Spring Southeastern Section, Columbia, SC, *Protein structure matching — an extension of the largest clique size in Erdős-Rényi random graphs* March 16-18, 2001, (20 min)
19. Third University of North Carolina at Greensboro Mini-Conference in Combinatorics and Graph Theory, *Algorithms for Optimizing Production DNA Sequencing* November 1999, (30 min)
20. Center for Nonlinear Studies Workshop, Los Alamos National Laboratory, Los Alamos, New Mexico, *Shifting in finite vector spaces* July 29-Aug 7, 1998 (60 min).

#### Contributed talks:

1. Sperner type problems and results, Combinatorics, Groups, Algorithms and Complexity, Ohio State University, March 21-15, 2010
2. Minimizing the number of episodes on a species tree an extension of Gallais theorem on intervals SIAM SEAS, Univ. of South Carolina, Columbia, March 2009
3. Minimizing the number of episodes on a species tree an extension of Gallais theorem on intervals Rnyi Institute of Mathematics of the Hungarian Academy of Sciences, Budapest, Hungary, June 22-25, 2009
4. The diameter of 4-colorable graphs, Fete of Combinatorics and Computer Science, Keszthely, Hungary, August 11 - 15, 2008
5. Minor crossing numbers, 21st Cumberland Conference on Graph Theory, Combinatorics and Computing in Honor of Mike Plummers 70th Birthday, May 15-17, 2008
6. Minor crossing number and crossing number of graphs, Extremal Combinatorics Workshop, Rnyi Institute of Mathematics of the Hungarian Academy of Sciences, Budapest, Hungary, June 4-8, 2007

#### Talks for General Audience/Outreach:

1. Talk on interesting problems to elementary school students at Mossy Oaks Elementary School, Beaufort, SC, May 2008
2. Colloquium talk at the Department of Mathematics and Computer Science, South Carolina State University, June 2006: Crossing numbers
3. Colloquium talk at the Department of Mathematics, Eastern Michigan University, November 2004: Which algorithm to choose
4. Eastern Pennsylvania and Delaware Section of the MAA, Gettysburg College, Gettysburg, PA, October 18, 2003, panelist: Careers in Mathematics
5. Career Night, Mathematics and Statistics Departments of the University of South Carolina, Columbia, SC, January 21, 2003

6. Mathematics Awareness Month Talk Series, Department of Mathematics and Computer Science of South Carolina State University, Orangeburg, SC, March 29, 2002: Sequence alignment algorithms
7. Spring Colloquium Series, Gettysburg College, Departments of Mathematics and Computer Science, Gettysburg, PA, April 19, 2001, panelist: Jobs in government
8. Mathematics Awareness Month Talk Series, Department of Mathematics and Computer Science of South Carolina State University, Orangeburg, SC, April 16, 1997: Mathematics and the internet
9. Euclidean Club at the Department of Mathematics and Computer Science of South Carolina State University, Orangeburg, SC, October 22, 1996: Trigonometry of the ancient Greek astronomers
10. Euclidean Club at the Department of Mathematics and Computer Science of South Carolina State University, Orangeburg, SC, March 20, 1996: Fractals
11. Euclidean Club at the Department of Mathematics and Computer Science of South Carolina State University, Orangeburg, SC, November 14, 1995: Oh, that colorful mathematics! (Problems that can be solved by coloring)

#### **Conference Organization:**

1. Discrete Mathematics and Bioinformatics Minisymposium (3 sessions) at the 33rd SIAM Southeastern Atlantic section Conference, April 4-5, 2009, Columbia, SC
2. Mini-Conference on Applied Combinatorics (member of the organizing committee, chair: G.O.H. Katona, committee members: J.R. Griggs and L.A. Székely) October 15-16, 2007, Columbia, SC
3. Ondrej Šýkora Memorial Theory Day, (member of the organizing committee, committee members: L.A. Székely and Imrich Vrto) June 7 2006, Loughborough University, UK

#### **Service:**

USC Mathematics Department:

- Scholarship and Advisory Committee (2011-present): Knowles Fellowship advisor (mentored 2011 scholarship winner Madison Miller)
- Undergraduate Advisor for math majors (2004-present)
- Undergraduate Advisory Committee (2006-present)
- Faculty Advisory Committee (2008-2010)
- Hiring Committee (2009-2010)
- PME/Gamecock Math Club Faculty Advisor (2009-2010)
- Gamecock Leadership Society Faculty Advisor (2009-2010)
- Events Committee (2009-2010)
- Qualifying Exam Committee chair (2009)
- Webpage Committee (2006-2008) — maintenance of Industrial Mathematics Institute webpages
- Member of High School Mathematics Committee (2006-2008)
- Qualifying exam committee member/reader for math Ph.D. students Aaron Dutle, Paisa Seeulangawat, Xing Peng
- M.S. defense exam committee member/reader for computer science student Thorben Primke

William & Mary Mathematics Department:

- Undergraduate Advisor for math majors (2004-2006)
- Undergraduate Curriculum Committee (2005-2006)

**Membership in Professional Organizations:** AMS, SIAM, MAA, Bolyai Mathematical Society in Hungary

**Refereeing Work:**

- SIAM Journal on Discrete Mathematics
- Discrete Mathematics
- Discrete Applied Mathematics
- Nucleic Acids Research

**Additional Information:**

- Publication 18. (list of publications) has been reviewed by Faculty of 1000 and received a rating of 6 (must read)
- Publication 18. has been reviewed in the September 30, 2002 issue of The Scientist.
- Publication 17. has been discussed in the December 23, 2002 issue of University of Utah News and Public Relations <http://www.utah.edu/unews/releases/02/dec/genome.html>
- Publication 17. has been discussed in the December 24, 2002 issue of BBC News World Edition (Science/Nature)
- Publication 17. has been discussed in the December 24, 2002 issue of Noticias (in Portuguese)
- Publication 17. has been discussed in the December 27, 2002 issue of The Washington Times (page A3)
- Publication 17. has been discussed in the December 30, 2002 issue of Washington Post (page A09, Science Notebook)