

Curriculum Vitae

Charles A. Cusack

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Education

- 2000 Ph.D. in Computer Science, University of Nebraska—Lincoln, Lincoln, NE
Dissertation: *Group Factorizations in Cryptography* (Advisor: Spyros Magliveras)
- 1998 M.S. in Computer Science, University of Nebraska—Lincoln, Lincoln, NE
Thesis: *Semiregular Large Sets* (Advisor: Spyros Magliveras)
- 1994 M.S. in Discrete Mathematics, Michigan Technological University, Houghton, MI
Thesis: *PSL(2,q) As An Automorphism Group Of A 3-design With Blocksize 5*
(Advisor: Donald Kreher)
- 1992 B.S. in Pure Mathematics, Michigan Technological University, Houghton, MI

Employment

- 2007- Assistant Professor, Computer Science, Hope Collage, Holland, MI
- 2005-2007 Visiting Assistant Professor, Computer Science, Hope College, Holland, MI
- 2005-2006 Software Engineer, Westshore Design, LLC, Holland, MI
- 2003-2004 Lecturer, Computer Science and Engineering, University of Nebraska—Lincoln
- 2001-2003 J.D. Edwards Professor and Lecturer, Computer Science and Engineering,
University of Nebraska—Lincoln (2-year appointment)
- 2000-2001 Lecturer, Computer Science and Engineering, University of Nebraska—Lincoln
- 1999-2000 Graduate Teaching Assistant, Computer Science and Engineering, University of
Nebraska—Lincoln
- 1995-1998 Graduate Teaching Assistant, Computer Science and Engineering, University of
Nebraska—Lincoln
- 1994-1995 Graduate Teaching Assistant, Mathematics and Statistics, University of
Nebraska—Lincoln
- 1992-1994 Graduate Teaching Assistant, Mathematics, Michigan Technological University

Publications

1. Charles Cusack, Chris Martens, Priyanshu Mutreja, "Volunteer Computing Using Casual Games," presented at *Future Play 2006 International Conference on the Future of Game Design and Technology*, London, Ontario, Canada, Oct 10-12, 2006. Published in Conference Proceedings.
2. Gretchen C. Foley, Charles A. Cusack, "Computer-Assisted Analysis of Music in George Perle's System of Twelve-Tone Tonality," *Computer Music Journal*, 30 (2006) No 3, pp. 53-66.
3. C.A. Cusack, S.M. Magliveras, "Semiregular Large Sets", *Designs, Codes, and Cryptography*, 18 (1999), pp. 81-87.
4. C.A. Cusack, S.W. Graham, D.L. Kreher, "Large Sets of 3-Designs from $PSL(2,q)$ with Block Sizes 4 and 5," *The Journal of Combinatorial Designs*, 3 (1995) No 2, pp. 147-160.
5. C.J. Colbourn, C.A. Cusack, D.L. Kreher, "Partial Steiner Triple Systems with Equal-Sized Holes," *The Journal of Combinatorial Theory Series A*, 70 (1995) No 7, pp. 56-65.

Presentations

1. Chris Martens, Priyanshu Mutreja, Charles Cusack, "Using a Volunteer Computing Game to Solve the Maximum Clique Problem," poster presentation at *Future Play 2006 International Conference on the Future of Game Design and Technology*, London, Ontario, Canada, Oct 10-12, 2006.
2. Charles Cusack, "Quantum Computing: How to do 2^n things all at the same time," *Third Annual Regional Workshop in the Mathematical Sciences*, University of Nebraska—Lincoln, Lincoln, NE, Oct 27-28, 2000.

Research Activities

1. *Volunteer Computing Games*, 2006-ongoing
Studying the use of casual games to enhance volunteer computing; worked with Chris Martens (Undergraduate, Carnegie Mellon University) and Priyanshu Mutreja (Undergraduate, Valparaiso University) developing a prototype game that can solve instances of the Maximum Clique Problem; investigating how to turn volunteer algorithms into interesting games; studying the feasibility and value of this approach.
2. *Graph Pebbling*, 2007-ongoing
Studying various problems related to graph pebbling, including pebbling numbers and thresholds for certain classes of graphs. I am particularly interested in finding polynomial-time algorithms for pebbling specific classes of graphs.
3. *Group Factorizations in Cryptography*, 1998-2000
Classified logarithmic signatures of permutation groups; studying the structure of the subgroup of $S_{|G|}$ induced by the set of tame logarithmic signatures of a group G ; evaluating the potential of creating a secure public-key cryptosystem based on logarithmic signatures of certain types of groups.

4. *Automorphism Groups of Combinatorial Designs*, 1993-1998
 - a. Developed the notion of t -homogeneous, G -semiregular large sets of t -designs; proved that there exist infinitely many 3-homogeneous $\text{PSL}(2,q)$ -semiregular large sets; found all t -homogeneous, G -semiregular large sets with $t \geq 3$.
 - b. Gave necessary and sufficient conditions for the existence of large sets of 3–designs with block size 5 in which each design admits $\text{PSL}(2,q)$ as an automorphism group.

Software Development

1. *SmartSensor*, 2005-2006

Developed a Java-based interface to an industrial control to perform data viewing, data logging and calibration.
2. *T3RevEng*, 2004-2005

Worked with Gretchen Foley (Assistant Professor, Department of Music, UNL) to develop a Java application to assist in the analysis of music in George Perle's System of *Twelve Tone Tonality*.
3. *Web-Based Programming Contests Judge*, 2002-2004

Worked with Chris Hammack (Graduate Student, UNL) and Andrew Watt (Undergraduate, UNL) to create a web-based submission and execution platform to judge programming contests.
4. *Webhandin*, 2003-2005

Worked with Cory Lueninghoener and Ryan Lim (Graduate Students, UNL) to develop a web-based submission system for homework assignments for courses in the Department of Computer Science and Engineering at UNL; modified the program for use at Hope College.
5. *TACSE (Tutorials and Applets for Computer Science Education)*, 2001-2003

Worked with Chris Hammack (Graduate Student, UNL) to create an online repository of tutorials, lecture notes, applets, and links related to computer science and mathematics topics which allowed users to view, submit, and rate content.
6. *Discrete Structures Applets*, 2001-2002

Worked with Chris Hammack and Cory Lueninghoener (Graduate Students, UNL) to create Java applets to help students learn about functions, truth tables, and set operations; created Java applet that allows users to apply logical equivalences to arbitrary propositions.

Awards, Fellowships, and Grants

1. *HHMI Interdisciplinary Research Grant* (\$10,000, with Airat Bekmetjev, mathematics), Hope College, 2007
2. *Computational Science and Modeling Scholar* (\$3,175 support for student), Hope College, 2007

3. *Outstanding Teaching Award for Lower Division Courses*, Department of Computer Science and Engineering, UNL, 2002-2003
4. *Beta Theta Pi Faculty Recognition Award*, UNL, 2003
5. *National Center for Information Technology in Education Grant* (\$15,000), UNL, 2001-2002
6. *J.D. Edwards Professorship* (\$10,000), UNL, 2001-2002
7. *Outstanding Contributions to the J.D. Edwards Honors Program*, UNL, 2001-2002
8. *UNL Graduate School Fellowship*, UNL, 1998-1999
9. *Merk Hobson Memorial Fund Fellowship*, UNL, 1997-1998
10. *Mary E. & Elmer H. Dohrman Fellowship*, UNL, 1996-1997
11. *Outstanding M.S. Student of the Year in Math*, MTU, 1993-1994
12. *Charles Knobloch Math Scholarship*, MTU, 1992
13. *Undergraduate Research Experience*, MTU, 1991-1992

Pedagogical and Curricular Development Activities

1. Course Supplements Websites, 2000-ongoing
Maintain a website with programming examples in Java, C++, PHP, and MySQL for students who learn by example; maintain a website with lecture notes and supplements for discrete mathematics, data structures, algorithms, and other topics.
2. Retooled *Introduction to Computer Science II*, UNL, 2004
Created a new CS2 (second introductory) course which included the traditional object-oriented programming and data structures topics, but revolved around building a web-based, 3-tier application; Worked with Joyita Mallik, Saket Das, and Xuli Liu (Graduate Students, UNL) to develop labs for the course.
3. Improved *Introduction to Discrete Structures* course, UNL, 2003-2004
To make the material more relevant, added programming assignments which required students to implement one or more concepts from the course and apply course concepts; required students to create a web-based tutorial on a discrete mathematics topic to help them learn and communicate better.
4. Improved *Data Structures and Algorithms* courses, UNL, 2003
Reorganized the course to group topics by algorithmic technique rather than the traditional problem-based approach; added introductory sections on distributed algorithms, computability theory, and complexity theory.
5. Taught *Quantum Computing*, UNL, 2003
First time taught in department; students included graduate and undergraduate students in computer science, mathematics, and physics; theoretical course, with subjects including foundational mathematics and quantum physics, quantum gates, quantum algorithms, and quantum error correction.

6. Curriculum Development, J.D. Edwards Honors Program, UNL, 2001-2002

Designed three new courses for the program; integrated discrete mathematics topics throughout the courses; worked with business faculty to integrate business concepts into each course.

Teaching**Hope College**

Fall 2007	CSCI 235	Software Design & Data Structures
	CSCI 112/114	Introduction to Computer Science (2 sections)
	CSCI 114	Introduction to Computer Science Lab
Spring 2007	CSCI 470	Languages and Machines
	CSCI 112/114	Introduction to Computer Science (2 sections)
	CSCI 114	Introduction to Computer Science Lab
Fall 2006	CSCI 235	Software Design & Data Structures
	CSCI 112/114	Introduction to Computer Science (3 sections)
Spring 2006	CSCI 385	Advanced Data Structures and Algorithms
	CSCI 114	Introduction to Computer Science Lab
Fall 2005	CSCI 295	Software Design & Data Structures
	CSCI 114	Introduction to Computer Science Lab (2 sections)

University of Nebraska—Lincoln

Fall 2004	CSCE 235	Introduction to Discrete Structures
Spring 2004	CSCE 156	Introduction to Computer Science II
Fall 2003	CSCE 101	Computer Science Fundamentals
	CSCE 235	Introduction to Discrete Structures
	CSCE 310	Data Structures and Algorithms
	CSCE 310J	Data Structures and Algorithms, JDE Section
Spring 2003	CSCE 423/823	Design and Analysis of Algorithms
	CSCE 469/896	Quantum Computing
Fall 2002	CSCE 155J	Introduction to Computer Science I, JDE Section
	CSCE 235	Introduction to Discrete Structures
Spring 2002	CSCE 156J	Introduction to Computer Science II, JDE Section
	CSCE 310J	Data Structures and Algorithms, JDE Section
Fall 2001	CSCE 155J	Introduction to Computer Science I, JDE Section
	CSCE 235J	Introduction to Discrete Structures, JDE Section
Spring 2001	CSCE 423/823	Design and Analysis of Algorithms
	CSCE 156H	Introduction to Computer Science II, Honors Section
Fall 2000	CSCE 310	Data Structures and Algorithms
	CSCE 156	Introduction to Computer Science II

Spring 2000	CSCE 310	Data Structures and Algorithms
Fall 1999	CSCE 310	Data Structures and Algorithms
Summer 1999	CSCE 310	Data Structures and Algorithms
Spring 1998	CSCE 235	Introduction to Discrete Structures (T.A.)
Fall 1997	CSCE 251U	UNIX Programming
Summer 1997	CSCE 251U	UNIX Programming
	CSCE 251K	C Programming
Spring 1997	CSCE 230	Computer Organization (T.A.)
Fall 1996	CSCE 230	Computer Organization
Spring 1996	CSCE 252D	FORTRAN Programming
Fall 1995	CSCE 110	Introduction to Data Processing
Spring 1995	MATH 101	College Algebra
Fall 1994	MATH 106	Calculus 1 (T.A.)

Michigan Technological University

Spring 1994	MATH 151	Calculus 2
Winter 1994	MATH 151	Calculus 2
Fall 1993	MATH 150	Calculus 1 (T.A.)
Summer 1993	MATH 151	Calculus 2
Spring 1993	MATH 131	Trigonometry
Winter 1993	MATH 130	College Algebra
Fall 1992	MATH 133	Pre-Calculus (T.A.)

Professional Societies

- Association for Computing Machinery (ACM)
- ACM Special Interest Group on Computer Science Education (SIGCSE)
- ACM Special Interest Group on Algorithms and Computational Theory (SIGACT)
- International Game Developers Association (IGDA)

Service

1. Coordinator, CSE Day Committee, CSE, UNL, 2001-2004
Organized annual high school programming contest and outreach event which attracts 75-100 students from 15-25 high schools across the state of Nebraska each year
2. Member, Curriculum Committee, CSE, UNL, 2001-2004
Led initiative to update curriculum to bring it in line with the *ACM/IEEE Computing Curricula 2001*
3. Chair, Outreach Committee, CSE, UNL, 2003
Oversaw CSE Day, Technology Fair, Department Newsletter

4. Member, Services Committee, CSE, UNL, 2001-2003
5. Member, Curriculum Committee, JDE, UNL, 2001-2002
Developed 3 courses for the program
6. Member, Admissions Committee, JDE, UNL, 2001-2002
Screened files, interviewed candidates
7. Member, Academic Integrity Policy Committee, CSE, UNL, 2001
Developed the policy for our department
8. Member, Equipment Committee, CSE, UNL, 2000-2001
9. Member, Undergraduate Advising Committee, CSE, UNL, 2000-2001
10. Member, Computer Science and Engineering Chair Search Committee, UNL, 1999-2000
11. Member, Faculty Search Committee, CSE, UNL, 1997-1998
12. Member, Equipment Committee, CSE, UNL, 1997-1998