

Christopher Kauffman

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Education

Ph.D. Computer Science, University of Minnesota, Twin Cities. 2013.
Dissertation: Computational Methods for Protein Structure Prediction and Energy Minimization.

M.S. Computer Science, University of Minnesota, Twin Cities, 2010.

B.S. Computer Science, University of Minnesota, Twin Cities, 2004.
Minor in Mathematics. Graduated with High Distinction.

Teaching Experience

Teaching samples available at <http://cs.gmu.edu/~kauffman/teaching-samples>

Lecturer Fall 2017 - Present, Department of Computer Science, University of Minnesota, Twin Cities Minnesota.

Term Assistant Professor Fall 2012 - Summer 2017, Department of Computer Science, George Mason University, Fairfax, VA.

- Full-time, non-tenure track. Course load of 4 sections per semester, 2-3 preparations. Contract-based, no research responsibilities, service responsibilities related to undergraduate education.
- Taught courses on introductory programming (CS 211, Java), data structures (CS 310), computer ethics (CS 105), parallel programming (CS 499), programming for engineers (CS 222, C language), and CS for non-majors (CS 100). Contributed significantly to course development including new projects, labs, and grading rubrics.
- Class sizes range from 35 to 90; focus on active and engaging teaching strategies during lecture including in-class participation credit, live coding, and group problem sets.
- Developed two courses, CS 100: Principles of Computing (for non-majors) and CS 499: Parallel Computing (special topics for seniors).
- Led a CS teaching study group as part of an NSF funded program to improve engineering education.
- Mentored 6 undergrads on research projects through internal GMU funding sources.
- Active member of the Undergraduate Studies Committee to develop curriculum, primary author of CS honors program, honors college coordinator.
- Presently academic adviser for 65 students including 26 honors college students.

Instructor for CSC 301: Programming and Problem Solving, Fall 2011, Department of Mathematics, Concordia University, St. Paul. Responsible for complete design and instruction of intro Java course for 15 students in math and science majors.

Instructor for CSCI 2011: Discrete Structures of Computer Science, Summer 2011, Department of Computer Science, University of Minnesota. Responsible for instruction on mathematical concepts pertinent to computer science including lecture, assignments, and exams for 30 second-year students.

Summary of Teaching Ratings from GMU Student Evaluations

Course#	Teaching ¹	Course ²	#Rates ³	#Stdnts ⁴	#Sects ⁵	Course Title / Comment
CS100	4.61	4.07	85	114	3	Principles of Computing
CS105	4.77	4.24	568	654	19	Computer Ethics and Society
CS211	4.78	4.53	140	299	6	Object-Oriented Programming
CS222	4.75	4.46	105	145	4	Computer Programming for Engineers
CS310	4.70	4.44	244	364	8	Data Structures
CS499	4.84	4.84	25	33	1	Parallel Computing
All	4.74	4.34	1167	1609	41	Overall average of all ratings
<i>Dept.</i>	4.24	4.06				Overall Department Average ratings

- Ratings are averages over all students who provided ratings in a course.
- Teaching¹ measures answers to the prompt: "My overall rating of the teaching" rated from 1 (worst) to 5 (best)
- Course² measures answers to the prompt: "My overall rating of this course" rated from 1 (worst) to 5 (best)
- #Rates³ counts the total number of students who provided paper evaluations over all courses
- #Stdnts⁴ counts the total number of students who were enrolled each courses
- #Sects⁵ counts the total number of sections of a course which was rated

Service

GMU CS Undergraduate Studies Committee. Fall 2012 - present. Active member since starting at GMU. Contributed to several specific goals including developing a CS departmental honors program (primary author), reforming curriculum to align with ACM 2013 and ABET recommendations, and giving recommendations to the university for General Education Information Technology learning outcomes.

GMU CS Web Committee. Fall 2013 - present. Coordinated efforts to develop a new department homepage. Implemented several subsystems on the Django/Python site for syllabus upload, faculty directory, and technical reports display.

SIMPLE Teaching Group Leader for CS. Fall 2015 - present. Small group meeting monthly to discuss education issues in in computer science including handling large classes, effective pedagogy, and improving diversity. Guided a discussion at a summit of group leaders and members on being inclusive in courses while retaining rigor. SIMPLE is an NSF funded project at GMU to improve engineering education. <http://simple.onmason.com>

Faculty Adviser for GMU PatriotHackers Student Group. Fall 2013 - present. Provided support for students interested in computer security including procuring equipment, advising on meeting topics, and recruiting members. <https://patriothackers.org>

Journal Reviews for Bioinformatics (1 review), Proteins (1 review), Journal of Computational Chemistry (1 review), Theoretical Chemistry Accounts (1 review), Biomed Central Bioinformatics (3 reviews), IEEE Transactions on Knowledge and Data Engineering (2 reviews).

Refereed Conference, full paper reviews for European Conference on Computational Biology (ECCB), ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), International Conference on Data Mining (ICDM), SIAM International Conference on Data Mining (SDM), European Conference on Machine Learning (ECML), International Parallel and Distributed Processing Symposium (IPDPS), Conference on Information and Knowledge Management (CIKM), International Symposium on Bioinformatics Research and Applications (ISBRA), International Conference on Genome Informatics (GIW).

DC STEM Fair Judge, 2014-2016. Judged a variety of K-12 student science projects for awards and advancement to higher fairs. Grand Awards Judge for advancement to the International Science and Engineering Fair twice.

Awards & Honors

Teaching Excellence Award Winner, 2016-17, George Mason University. Nominated from 1,000+ faculty and selected from a pool of 30 applicants to be one of 8 winners of the annual, University-wide award. Special recognition for Technology-Enhanced Teaching.

Computer Science Department Teaching Excellence Award, George Mason University, Spring 2015.

Nominee for George Mason University Teaching Excellence Award , Fall 2015.

Travel Grant to attend the European Conference on Computational Biology, September 2010, Ghent, Belgium (1200 Euros).

NIH Biotechnology Training Grant Trainee, June 2006 - June 2008 University of Minnesota. Selected graduate students received special training in new biotechnology developments including special lectures on sequencing technology, ethics, and interdisciplinary collaboration.

Japanese University Exchange, November 2007, Nara Institute of Science and Technology, Ikoma, Japan. After hosting several Japanese graduate students in computing and biological sciences, visited their university for one month to facilitate collaboration and idea exchange.
<http://bsgcoe.naist.jp/en>

Research Interests

Interplay of optimization theory and machine learning.

Protein structure prediction as an optimization/learning problem.

Applications of machine learning to bioinformatics.

Clustering programming projects to enable efficient grading.

Undergraduate Research Advisees and Projects

Abbreviations: OSCAR = Office of Student Scholarship, Creative Activities, and Research
URSP = Undergraduate Research Scholars Program

- 2016-on Ethan Rarity. OSCAR Federal Work Study. Support Vector Machine / R Interface Library (SVM/R). Focus on improving efficiency and flexibility of large dataset representation for machine learning in the R statistics language.
- 2016-on Hernan Ariascu. OSCAR Federal Work Study. DrJava IDE improvements to support CS course instruction in several GMU courses. Focus on improving quality of an excellent but orphaned IDE for beginning programming; improving compiler and unit test support. Resulted in a special edition with improvements which is used by GMU students: <https://cs.gmu.edu/~kauffman/drjava/>
- 2016 Xiaowen Fang. Independent project on clustering student programs to scale grading. Focus on using existing techniques for program plagiarism detection to cluster programs to ease the task of grading large numbers of student programs
- 2013-15 Cycielya Schultz, OSCAR Federal Work Study. AIDS Education Game Development. Focus on developing an interactive teaching game which demonstrates HIV infection at the molecular level, makes use of a Java-based game framework which can deploy desktop and web gaming, experience with Box2D physics engine. Collaboration with James Reid Schwebach in biology department.
- 2015-16 Vankhanh "Lilas" Dinh. OSCAR URSP Award. Lojban as an Intermediate for Natural Language Translation. Presented work at the National Conference on Undergraduate Research and the GMU/VSE Undergraduate Research Celebration.
- 2014 Saif Rizvi. OSCAR Federal Work Study. SVM / R Interface Library.
- 2013 Edward Martin. OSCAR URSP Award. AIDS Education Game Development.

Research Groups and Proposals

Proposal for an NSF REU Site on Educational Data Mining. 2015 and 2016. Co-author with Huzefa Rangwala of a proposal for a Research Experience for Undergraduates (REU) program to be held during summers at GMU. Students would focus on learning basic data mining and machine learning with applications to improving the quality of educational outcomes. Will instruct on machine learning tutorials and mentor several student projects.

SPARC Project. 2015 and 2016. Co-PI for Google funded project to increase retention and diversity in introductory programming courses while scaling up teaching capacity. Experimental sections focus on self-paced and peer-assisted learning during CS 1 and CS 2 courses. Project site: <https://sparc.cs.gmu.edu/>

Publications

Journal Papers and Book Chapters

- [1] **Chris Kauffman** and George Karypis. Ligand binding residue prediction. In *Introduction to Protein Structure Prediction: Methods and Algorithms*, Wiley Series in Bioinformatics. Wiley, 2010.

- [2] **Chris Kauffman** and George Karypis. LIBRUS: combined machine learning and homology information for sequence-based ligand-binding residue prediction. *Bioinformatics*, 25(23):3099–3107, 2009.
- [3] Huzefa Rangwala, **Christopher Kauffman**, and George Karypis. svmPRAT: SVM-based protein residue annotation toolkit. *BMC Bioinformatics*, 10:439, 2009.
- [4] **Christopher Kauffman** and George Karypis. Computational tools for protein-DNA interactions. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 2(1):14–28, 2012.
- [5] **Christopher Kauffman** and George Karypis. Coarse- and fine-grained models for proteins: evaluation by decoy discrimination. *Proteins*, 81(5):754–773, May 2013.

Conference Proceedings

- [1] Huzefa Rangwala, **Chris Kauffman**, and George Karypis. A kernel framework for protein residue annotation. In *Proceedings of the 13th Pacific-Asia Conference on Knowledge Discovery and Data-Mining*, 2009.
- [2] **Chris Kauffman**, Huzefa Rangwala, and George Karypis. Improving Homology Models for Protein-Ligand Binding Sites. In *LSS Computational Systems Bioinformatics Conference*, Stanford, CA, 2008.
- [3] **Chris Kauffman** and George Karypis. An Analysis of Information Content Present in Protein-DNA Interactions. In *Proceedings of the Pacific Symposium on Biocomputing*, pages 477–488, 2008.
- [4] Huzefa Rangwala, **Christopher Kauffman**, and George Karypis. A generalized framework for protein sequence annotation. In *Proceedings of the NIPS Workshop on Machine Learning in Computational Biology*, Vancouver, B.C., Canada., 2007.
- [5] Sigve Nakken, **Christopher Kauffman**, and George Karypis. Finding functionally related genes by local and global analysis of medline abstracts. In *SIGIR04 Bio Workshop: Search and Discovery in Bioinformatics*, Sheffield, UK, July 2004.

Conferences Attended

ACM Special Interest Group on Computer Science Education (SIGCSE), Memphis, Tennessee, 2016. Attendee only. Workshops on parallel computing and educational research.

ACM Special Interest Group on Computer Science Education (SIGCSE), Atlanta, Georgia, 2014. Attendee only. Focused on active teaching strategies and effective programming pedagogy.

Innovations in Teaching and Learning (ITL), George Mason University, Fairfax VA, Fall 2014, 2015, 2016. Presented a poster during 2016 on interactive teaching techniques used in programming classes.

European Conference on Computational Biology (ECCB), Ghent, Belgium, 2010. Poster presentation *A Convex Programming Model for Protein Structure Prediction*.

Computational Systems Bioinformatics Conference (CSB), Stanford, California, 2008. Paper presentation *Improving Homology Models for Protein-Ligand Binding Sites*.

Pacific Symposium on Biocomputing (PSB), Big Island, Hawaii, 2008. Poster presentation of paper: *An Analysis of Information Content Present in Protein-DNA Interactions*.

Critical Assessment of Techniques for Protein Structure Prediction (CASP), Pacific Grove, California, 2006. Student participant.

Invited Lectures

Protein Folding by Computer, by Hand, Spring 2016 guest lecture in CS 101: Preview of Computer Science. Fall 2013/2014 guest lecture in CS 390: Research and Project Design Principles in Computing. Discussed applications of machine learning and optimization to protein folding,

Freeing the Mind with the Machine, Fall 2016 invited talk for SRCT student group workshop on open source software development. Discussed reasons to get involved with open source software through use and code contributions.

Codons, Computers, and our Genomic Future, Fall 2011, invited talk for the Sigma Pi seminar series, Concordia University, St. Paul. Discussed how computation enables increased understanding of the genome.

Professional Experience

Cray Inc., Software Development Intern, Summer 2004 and 2005, Mendota Heights, MN. Worked in the parallel compiler development group on implementing a profile feedback mechanism and on process simulator enhancements.

Army High Performance Computing Research Center, Research Intern, Summer 2003. Developed software to handle global contact search for solid body simulations while gaining experience with parallel computing.

Minnesota Supercomputing Institute, Research Intern, Summer 2002, Minneapolis, MN. Extended features of a sparse matrix computations software package.