

## Curriculum Vitae

### Dr. Melissa Danforth

**Address:**

Department of Computer and Electrical Engineering  
& Computer Science  
California State University, Bakersfield  
9001 Stockdale Highway – 63 SCI  
Bakersfield, CA 93311-1022

**Contact Information:**

Phone: (661)654-3180  
Fax: (661)654-6960  
Email: mdanforth@csub.edu  
Web: [www.cs.csub.edu/~melissa](http://www.cs.csub.edu/~melissa)

**Education**

California State University, Bakersfield	Computer Science and Biology	B.S. June 1999
Magna cum laude, Outstanding graduating senior in Computer Science		
University of California, Davis	Computer Science	M.S. March 2002
University of California, Davis	Computer Science	Ph.D. September 2006
Dissertation Title: Models for Threat Assessment in Networks		
Advisor: Dr. Karl Levitt		

**Teaching Experience**

Chair: July 2014 - present. Interim Chair: December 2013 - June 2014. Associate Professor: September 2012 - present. Department of Computer and Electrical Engineering & Computer Science (CEE/CS). California State University, Bakersfield (CSUB).

Awarded tenure and promotion in sixth year review cycle. Instrumental in designing new Information Security curriculum as a concentration in the Computer Science degree. Active in grant writing in both pedagogy and cyber security, with multiple grant awards. Instrumental in the department's quarter-to-semester conversion process.

Assistant Professor. CEE/CS Department (formerly Department of Computer Science). CSUB. September 2006 - August 2012.

Teaching courses in programming, Unix, networks, cyber security and information assurance, and other department courses. Working on research in network security using evolutionary computation. Involved undergraduate students in information security research. Created a high school outreach program in cyber security.

Lecturer. Department of Computer Science. CSUB. January 2006 - August 2006.

Taught courses in Unix System Administration and Computer Networks for Winter 2006 quarter. Taught the courses Programming Fundamentals and Advanced Computer Networks and Computer Security for Spring 2006.

Teaching Assistant, Data Structures. Department of Computer Science. UC Davis (UCD). September 2000 - June 2001.

Led two to four weekly discussion sections for upper division undergraduate course consisting of approximately 80 students. Designed worksheets for discussion sections. Assisted students with their programming assignments and homework. Graded examinations and final.

Tutor/Professor's Assistant. Department of Computer Science. CSUB. September 1997 - June 1998.

Tutored students in lower division programming fundamentals, object-oriented programming, data structures and introductory UNIX courses. Assisted students with homework and programming assignments. I was also a teacher's assistant for a lower division non-major course in basic computer use, including word processing and spreadsheet use.

**Research Experience**

Mentor for Undergraduate Research. Ernest Richards. CSUB. Academic Year (AY) 2014 - 2015.

Mentored Ernest on a project involving the testing and debugging of my EVA artificial immune system program to detect malicious web server requests in real-time. Ernest won first place in the Undergraduate division of the 2015 CSUB Student Research Poster Competition for his work on this project.

Mentor for the CSU LSAMP Program. Alfonso Puga. CSUB. AY 2013 - 2014.

Supervised Alfonso's work on a multi-threaded packet capture program that is capable of reassembling fragmented IP packets. The program is intended to work in conjunction with my EVA artificial immune system. Alfonso won multiple student research awards for this project: 1st place in the Computer Sciences and Information Management poster competition at the 2014 Emerging Researchers National Conference and 1st place in the Computer Science and Engineering oral presentation competition at the 2014 CSUB Student Research Competition.

Mentor for the McNair Scholar Program. Robert Morning. CSUB. AY 2011 - 2012.

Supervised Robert's second year McNair project where Robert surveyed current techniques in digital forensics with respect to deleted file recovery. This project was originally planned to be continued in AY 2012 - 2013, but funding for CSUB's McNair Scholar Program was not renewed.

Mentor for the McNair Scholar Program. Robert Morning. CSUB. AY 2010 - 2011.

Mentored Robert for his research topic on hex editors for the McNair Scholar Program. This project focused on making a hex editor, which is commonly used in computer security and digital forensics to examine files to find hidden information.

Faculty Mentor for the CSU Chancellor's Doctoral Incentive Program (CDIP). Jonathan Berling. AY 2010 - 2011.

Developed a plan for research support during Jonathan's years at graduate school and mentoring support for his planned future career as a CSU faculty member. Jonathan was accepted as a CDIP scholar for the 2010 - 2011 school year, but he has deferred for one year in order to apply at more high-quality graduate programs.

Mentor for McNair Scholar Program. Jonathan Berling. CSUB. AY 2009 - 2010.

Mentored Jonathan for his research topic, "Simplify", for the McNair program. This project focused on creating a compiled programming language that has several features of an interpreted language.

Mentor for McNair Scholar Program. Jonathan Berling. CSUB. AY 2008 - 2009.

Mentored Jonathan for his research topic, "Classifying Reports using Evolutionary Computation", for the McNair program. This research project used evolutionary computation to classify human-readable reports based on keywords in the reports.

Graduate Student Researcher. Department of Computer Science. UCD. July 2003 - December 2005.

Worked with NetSquared Inc. to develop methods for administrators to do automated threat assessments on networks. Focused primarily on scalable methods to create automatic attack graphs that can be used on large, real world networks. Developed expert system code to generate attack graphs using real exploit descriptions and abstract exploit classes.

Researcher. NetSquared Inc., June 2002 - June 2003.

Investigated machine learning algorithms to evaluate and predict trends in attack patterns from alerts and reports. Worked on code to rank current network and host activity to form priority list. Also developed an artificial immune system using genetic algorithms to detect unknown attacks in web server requests.

Research Assistant. Department of Computer Science. UCD. June 2001 - June 2002.

Project goal was to create a robust, redundant network. Primarily investigated methods to automatically determine and distribute signatures for attacks in the network. Developed code in an expert system to compute decision trees, check configuration, detect unknown attacks and compute responses.

**Publications**

- M. Danforth, C. Lam, H. Mehrpouyan, R. Hughes. "Impact of a Hands-On, Exploratory Engineering Outreach Program on Knowledge and Attitudes of High School Students". Annual Conference for the American Society for Engineering Education (ASEE). New Orleans, LA, USA, June 2016.
- M. Danforth, C. Lam. "Implementation of Multidisciplinary Cyber Security Curriculum at a Medium Sized Campus". Extended abstract and roundtable presentation at the Colloquium for Information Systems Security Education (CISSE), Philadelphia, PA, USA, June 2016.
- M. Danforth, C. Lam. "Four Week Summer Program in Cyber Security for High School Students: Practice and Experience Report". Extended abstract and panel discussion at the Workshop on Cyber Security Experimentation and Test (CSET'14), co-hosted at the Usenix Security Conference, San Diego, CA, USA, August 2014.
- C. Lam, M. Danforth, R. Hughes. "A Comprehensive Approach on Delivering Calculus to Engineering Students". Annual Conference for the American Society for Engineering Education (ASEE). Indianapolis, IN, USA, June 2014.
- M. Danforth. "WCIS: A Prototype for Detecting Zero-Day Attacks in Web Server Requests." Proceedings of the Usenix Large Installation System Administration Conference, LISA 2011, Boston, MA, USA, December 4-9, 2011.
- M. Danforth. "Towards a Classifying Artificial Immune System for Web Server Attacks." Proceedings of the IEEE International Conference on Machine Learning and Applications, ICMLA 2009, Miami, FL, USA, December 13-15, 2009, pp. 523-527.
- M. Danforth. "EVA: A Framework for Network Analysis and Risk Assessment." Proceedings of the Usenix Large Installation System Administrators Conference, LISA 2009, Baltimore, MD, USA, November 1-6, 2009, pp. 65-77.
- M. Danforth. "Scalable Patch Management using Evolutionary Analysis of Attack Graphs". Proceedings of the IEEE International Conference on Machine Learning and Applications, ICMLA 2008, San Diego, CA, USA, December 11-13, 2008, pp. 300-307.
- M. Danforth. "Analysis of Attack Graphs using Evolutionary Computation". Military and Security Applications of Evolutionary Computation workshop at Genetic and Evolutionary Computation Conference, GECCO 2006, Seattle, WA, USA, July 2006.
- M. Danforth and K. Levitt. "Immune System Model for Detecting Web Server Attacks". Proceedings of the International Conference on Machine Learning and Applications, ICMLA 2003, M. Arif Wani, K. Cios and K. Hafeez, eds., Los Angeles, CA, USA, June 23-24, 2003, pp. 161-167.
- M. Danforth. "Immune System Model for Detecting Web Server Attacks". Proceedings of the 2002 UC Davis Student Workshop on Computing, Technical Report CSE-2002-28.
- J. E. Just, J. C. Reynolds, L. A. Clough, M. Danforth, K. N. Levitt, R. Maglich, and J. Rowe. "Learning Unknown Attacks - A Start." Proceeding of the 5th International Symposium, RAID 2002, Recent Advances in Intrusion Detection, A. Wespi, G. Vigna, and L. Deri, eds., Zurich, Switzerland, October 16-18, 2002, pp. 158-176.

**Poster Sessions**

- C. Lam, M. Danforth, R. Hughes. "Short-term Exploratory Summer Program for At-Risk First Year Students (work in progress)". Presented at Annual Conference for the American Society for Engineering Education (ASEE). New Orleans, LA, USA, June 2016.

- M. Danforth, C. Lam. “One-week Summer Program for At-Risk Students”. Presented at the AAAS/NSF Envisioning the Future of Undergraduate STEM Education Symposium, Washington DC, USA, April 2016.
- M. Danforth, C. Lam. “Outreach Program for High School Students in Cyber Security (In Progress).” Presented at the Pacific Southwest Regional Conference of the American Society for Engineering Education (ASEE PSW). San Diego, CA, USA. April 2015.
- H. Mehrpouyan, C. Lam, M. Danforth, R. Hughes. “A Summer Engineering Outreach Program for High School Students”. Presented at Annual Conference for the American Society for Engineering Education (ASEE). Indianapolis, IN, USA. June 2014.
- M. Danforth and S. Garcia. “Experiences Teaching System Administration via Online Modules.” Presented at Summit for Educators in System Administration (SESA), co-hosted at USENIX LISA. Washington DC, USA. November 2013.

### **Work in Progress**

- M. Danforth, C. Lam. “Effects of a Four-Week Cyber Security Summer Program on the Attitudes and College Interests of High School Students”. Short work-in-progress abstract and presentation at CISSE 2016. Final paper will be submitted to CISSE’s Fall/Winter journal.

### **Student Research**

- E. Richards (Faculty advisor: M. Danforth). “An Application of a Classifying Artificial Immune System for Web Server Defense.” Poster presentation at the 2015 CSUB Student Research Poster Competition. Mr. Richards won first place in the Undergraduate division.
- E. Richards (Faculty advisor: M. Danforth). “An Application of a Classifying Artificial Immune System for Web Server Attacks.” Oral presentation at the 2015 CSUB Student Research Competition.
- A. Puga (Faculty advisor: M. Danforth). “Web Server Automated Immune System.” Poster presentation at the 2014 CSUB Student Research Poster Competition.
- A. Puga (Faculty advisor: M. Danforth). “Web Server Automated Immune System.” Poster presentation at the 2014 NSF Emerging Researcher National Conference (ERN), Washington DC, USA, 2014. Mr. Puga won first place in the Computer Sciences and Information Management session.
- A. Puga (Faculty advisor: M. Danforth). “Web Server Automated Immune System.” Oral presentation at the 2014 CSUB Student Research Competition. Mr. Puga won first place in the Computer Science and Engineering division, and went on to give this presentation at the CSU-wide Student Research Competition in 2014.

### **Professional Activities**

- Reviewer and board member for the USENIX Journal of Education in System Administration (JESA).
- Reviewer for the ACM Computing Surveys and Transactions on Information and Systems Security (TISSEC) journals.
- Reviewer for the IEEE International Conference on Connected Vehicles and Expo (ICCVE) 2013.
- Organizer for the “Academic Roundtable” birds-of-a-feather session at Usenix LISA 2010 conference, San Jose, CA, USA, November 11, 2010.
- Invited to attend the National Science Foundation (NSF) Trustworthy Computing seminar, Washington, DC, USA, October 27-29, 2010.
- Member of Scientific Program Committee for the 4th International Conference on Information Security and Cryptography (ISC Turkey 2010), Ankara, Turkey, May 6-8, 2010.

**Grants Awarded**

US Department of Education Title V HSI grant.

Grant Period: October 2015 - September 2020.

Title – Increasing the Productivity of the Engineering Degree Pipeline in the High Needs Southern San Joaquin Valley: A Sound Cooperative Arrangement Project with Bakersfield College.

Award Number – P031S150037.

Funding – \$3,249,688.

Grant Roll – Engineering Coordinator.

Project Director (PI) – Jorge Talamantes.

NSF Improving Undergraduate STEM Education (IUSE) Program.

Grant Period: December 2014 - December 2017.

Title – STEM Retention and Graduation: An Integrated Approach.

Award Number – 1430398.

Funding – Received 3 year funding of \$1,002,206.

Grant Roll – Co-PI.

Principal Investigator – Charles Lam.

US Department of Education Title V HSI grant.

Grant Period: October 2010 - September 2015 (NCE to September 2016).

Title – Developing a Highly Structured Engineering Pathway for Hispanics Through an Intersegmental and Collaborative Approach.

Award Number – P031S100081.

Funding – Received 5 year funding of \$3,836,701.

Grant Roll – Project Director from January 2015 - September 2016. Interim Project Director from February 2014 - January 2015.

Department of Education Minority Science and Engineering Improvement Program (MSEIP).

Grant Period: October 2014 - September 2017.

Title – Developing Sustainable Interdisciplinary STEM Programs for First and Second Year Under-served Students in the Southern San Joaquin Valley.

Award Number – P120A140051.

Funding – Received 3 year funding of \$734,735.

Grant Roll – Summer Program Director.

Project Director (PI) – Charles Lam.

NSF Federal Cyber Service: Scholarship for Service (SFS) program. DUE – SFS-Institutional Development.

Grant Period: October 2012 – September 2015.

Title – Models for Information Assurance Education and Outreach.

Award Number – 1241636.

Funding – Requested and received 3 year, \$267,351 funding.

Grant Roll – Principal Investigator.

Co-PI(s) – Charles Lam, Mathematics.

Key Personnel – Mark Martinez, Political Science.

US Department of Education Minority Science and Engineering Improvement Program (MSEIP).

Grant Period: October 2011 – September 2014.

Title – Filling Essential Gaps in the High Needs San Joaquin Valley STEM Degree Pathways.

Award Number – P120A110050.

Funding – Requested and received 3 year, \$725,641 funding.

Grant Roll – Activities Director.

Project Director (PI) – Charles Lam, Mathematics.

CSUB Faculty TLC Professional Development Grant, Summer/Fall 2009.

Received a grant to support travel to LISA 2009 to present the EVA attack graph tool.

CSUB Research Council of the University (RCU) Grant, 2006 - 2007.

Received funding for research on network security and evolutionary computation.

### Service

Organizer of Eighth Annual Department “Capture the Flag” Contest – “Student Edition”. CSUB. June 2016.

Secretary for the CSU CS/IS/SE Discipline Council. Spring 2016 - present.

The CS/IS/SE Discipline Council is a CSU-wide discipline council for Computer Science, Information Systems, and Software Engineering chairs.

Department Chair Leadership Council (DCLC) representative for CSUB’s Information Technology Advisory Committee (ITAC). Fall 2015 - present.

Participant in the Ethics Across the Curriculum (EAC) initiative. CSUB. Fall 2013 - present.

Invited to participate in a multidisciplinary initiative to incorporate ethics in CSUB’s curriculum. Incorporated the techniques into the discussions of ethical data handling for CMPS 445 (Data Mining) and the ethics of cyber security research for CMPS 451 (Vulnerability Analysis) and CMPS 476 (Adv. Networking and Computer Security).

CSUB First Year Experience (FYE) RUSH-A Advisory Committee. CSUB. Fall 2011 - present.

Invited to be the NSME representative on the FYE Advisory Committee in Fall 2011. Re-selected to be on the committee in Spring 2013. This committee oversees the curriculum for the required CSUB 101 course for all incoming freshman. The committee also oversees the curriculum for the optional courses of CSUB 103 and CSUB 105.

Faculty Advisory Committee for interdisciplinary major in Global Intelligence and National Security (GINS). CSUB. Winter 2010 - present.

Instrumental in forming collaborations between GINS and NSME, such as the Information Security concentration within the Computer Science degree. Also assist other members of the committee with writing grants to secure new funding for the GINS program.

School of Natural Sciences, Mathematics, and Engineering (NSME) Curriculum and Area B/Theme 1 Committee. CSUB. Fall 2009 - Spring 2015. Chair of Committee: Fall 2013 - Spring 2015.

The committee approves curriculum changes within NSME and oversees the Area B and Theme 1 general education courses offered within NSME. During summer and fall 2014, the committee oversaw the quarter-to-semester conversion process for NSME.

Committee on Professional Responsibility (CPR). CSUB. June 2013 - May 2015.

The CPR handles allegations of unprofessional conduct that cannot be handled within the basic academic unit.

Faculty Juror for the following Student Research Competitions:

- CSUB Student Research Poster Competition. Spring 2016. Engineering and Computer Science division.
- CSUB Student Research Competition. March 2011. Physical and Mathematical Sciences division.

Moderator for the following Student Research Competitions:

- CSU-Wide Student Research Competition, Spring 2016. Engineering and Computer Science division.
- CSUB Student Research Competition, Winter 2016. Physical and Mathematical Sciences division.
- CSUB Student Research Competition, Winter 2015. Engineering and Computer Science division.

Search Committee Service. CSUB.

Served on the following search committees:

- Dean of the School of NSME. 2016/17 AY.
- CEE/CS Dept. Electrical and Computer Engineering and Computer Science faculty positions. Chair of Committee. 2015/16 AY.
- Associate Vice President of the ITS Department. Winter 2015.
- CEE/CS Dept. Computer Engineering and Computer Science faculty positions. Chair of Committee. 2014/15 AY.
- Associate Dean of the School of NSME. Fall 2014.
- Fab Lab Coordinator for the School of NSME. Summer and Fall 2014.
- CEE/CS Dept. Lecturer of Computer Science. Chair of Committee. Spring 2014.
- CEE/CS Dept. Administrative Support Coordinator. Winter and Spring 2014.
- Director of Infrastructure and User Support for the ITS Department. Fall 2013.
- CEE/CS Dept. Computer and Electrical Engineering faculty positions. 2013/14 AY.
- CEE/CS Dept. Computer and Electrical Engineering faculty positions. 2012/13 AY.
- CEE/CS Dept. Computer and Electrical Engineering faculty positions. 2011/12 AY.
- CEE/CS Dept. Computer Engineering faculty position. 2010/11 AY.

Organizer of Sixth Annual Department “Capture the Flag” Contest – “Student Edition”. CSUB. June 2014.

NSME Assessment Fellow. CSUB. February 2013 - August 2014.

Responsible for maintaining CEE/CS assessment areas on TaskStream for the degree programs (Computer Science, Computer Engineering, Electrical Engineering) and the department general education courses, and for coordinating the TaskStream assessment areas with department’s ABET assessment plan.

Organizer of the Fifth Annual Department “Capture the Flag” Contest – CSUB. June 2013.

Created a series of virtual machines containing the flags for the contest. Additional content was provided by Donna Meyers. Supervised the running of the contest.

NSME Retention, Tenure, and Promotion (RTP) Criteria Committee. CSUB. September 2012 - March 2013.

CEE/CS representative on the committee to develop school-wide RTP criteria for NSME. The criteria were delivered to the faculty of NSME at the beginning of April for a vote on adoption.

Advisor for Computer Science and Engineering Club. CSUB. Fall 2008 - Spring 2014.

Serving as advisor to the Computer Science and Engineering Club (formerly the Media and Technology Club) for students in the discipline.

Computer and Information Literacy Committee. CSUB. Fall 2006 - present.

Serving on the committee that is overseeing the implementation and assessment of the computer competency and information literacy graduation requirements. Re-elected to the committee in Fall 2008. This committee is currently in hiatus.

Organizer of Fourth Annual Department “Capture the Flag” Contest – “Student Edition”. CSUB. June 2012.

Students from my Spring 2012 Advanced Networking and Security class created their own capture the flag contest during the course of the term. All students in the department were invited to participate and try to capture the flags before the department end-of-the-year party.

Organizer of Third Annual Department “Capture the Flag” Contest. CSUB. June 2011.

Created virtual machines containing forensics “flags” for the students to capture for the contest. Organized the time, location and departmental flyers (with the help of Penny Lampkins for the flyers) for the contest. The contest was attended by a half dozen students.

Academic Technology Task Force. CSUB. October 2007.

Selected as the Computer Science department representative on Clarke Sanford’s academic technology task force.

Women in Engineering Link. UC Davis. Spring Quarter 2001.

Mentored a female computer science undergraduate student as part of the Women in Engineering program. The goal of the program is to encourage female undergraduate students to continue on to graduate school.

## **Presentations**

### **Dissemination Workshops.**

Held workshops in summer 2014 and summer 2015 for K-12 teachers and university faculty on the cybersecurity summer outreach program developed under the NSF Federal Cyber Service SFS grant.

### **Panel Discussions.**

Participated in the “Human Engagement Challenges in Cyber Testing and Training” panel at USENIX CSET 2014, discussing preliminary work on cybersecurity summer outreach conducted for the NSF Federal Cyber Service SFS grant.

### **Presentations at Conferences and Workshops.**

Presented work on cybersecurity curriculum and outreach program developed under the NSF Federal Cyber Service SFS grant at CISSE 2016.

Presented work on engineering outreach and mathematics curriculum enhancement at ASEE 2016 and 2014.

Presented work on attack graphs at LISA 2009 in November 2009, at ICMLA 2008 in December 2008 and at GECCO 2006 in July 2006.

Presented work on artificial immune systems at ICMLA 2009 in December 2009 and at ICMLA 2003 in June 2003. Presented work on the classifying artificial immune system at LISA 2011 in December 2011.

### **Presentations to Sponsors.**

Presented work on attack graphs to NSA in September 2004. Prepared presentation on attack graphs for ARDA PI meetings in 2004/2005.

## **Memberships**

Association for Computing Machinery (ACM) since 2006.

ACM Special Interest Group for Genetic and Evolutionary Computation (SIGEVO) since 2006.

ACM Special Interest Group on Security, Audit and Control (SIGSAC) since 2006.

USENIX: The Advanced Computing Systems Association since 2010.

USENIX LISA Special Interest Group for Sysadmins (formerly SAGE) since 2010.

American Society for Engineering Education (ASEE) since 2012.

ASEE Women in Engineering Divison (WIED) since 2013.

Association for Practical and Professional Ethics (APPE) since 2014.



**Honors**

Selected as a fellow for the Faculty Fellows Program. CSUB. 2015/16 AY.

Selected as a fellow for the Mid-Career Fellows program. CSUB. Winter 2013.

The Mid-Career Fellows program matches promising associate professors (the fellows) with mentors in academic administration and provides professional development to the fellows.

Graduate Assistance in Areas of National Need (GAANN) fellow. UCD. Awarded 2001.

Outstanding graduating senior for Computer Science. CSUB. 1999.

Inducted into the CSUB chapter of the national honor society Alpha Chi. 1998.

CSUB School of Arts and Sciences Merit Scholar. Awarded 1994.

**Courses Taught**

Vulnerability Analysis (CMPS 451/4510)

Developed elective course on source code auditing and binary analysis (reverse engineering) using C/C++ and Linux binaries as primary examples. Incorporated ethics components with respects to vulnerability disclosure.

Network and Computer Security (CMPS 476/4620)

Developed elective course on foundational computer and network security concepts: ethics and legal issues, cryptography, authentication, access control (discretionary and mandatory), secure OS design, malware concepts, intrusion detection/prevention, and so on.

Data Mining and Visualization (CMPS 445)

Developed elective course on data mining techniques using open source tools such as Python. Incorporated ethics components relating to privacy and information gathering.

Computer Networks (CMPS 376)

Computer Architecture (CMPS 321)

Senior Project I and II (CMPS 490A, 490B, 490)

Digital Forensics (CMPS 340)

Programming Languages (CMPS 350)

Artificial Intelligence (CMPS 356)

Data Structures and Algorithms (CMPS 223)

Object-Oriented Programming (CMPS 222)

Programming Fundamentals (CMPS 221)

Unix Programming Environment (CMPS 215)

Unix System Administration (CMPS 216)