Dr. Frank A. Hummer
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Personal/Professional Blog (Math, Science, and Philosophy): www.FranksBus.com

PROFESSIONAL SUMMARY

- Broad background in both pure and applied math and statistics, as well as philosophy
- 16 years of experience giving real guidance and encouragement to undergraduate math students, including both STEM majors and Humanities majors, at all course levels
- 24 years of experience solving math and engineering problems in GPS, cryptology, wireless network performance, image processing, coding theory, statistics, and algorithm design
- Creative problem solver who finds unexpected solutions to tough problems
- Highly regarded as an outstanding communicator by students, coworkers, and customers

PROFESSIONAL EXPERIENCE

Mathematician, Mercor Intelligence ***08/2025 – 03/2026***

- Independent contractor providing expertise in mathematics to improve models for a top AI lab

Senior Systems Engineer, Rockwell Collins (Collins Aerospace/Raytheon) ***11/2003 – 09/2024***

- Developed algorithms that greatly improved GPS and wireless network efficiency.
- Researched energy efficiency trade-offs related to various Sensor Network protocols
- Created a statistical tool enhancing the NIST Pseudorandom Number Generation standards
- Earned two patents for cryptographic authentication in mobile ad hoc networks (MANETs)
- Accelerated chip-design project by two months through my three-day effort to optimize the Montgomery multiplication algorithm.
- Revised algorithms and test cases for cryptographic chip design, saving $2 million, and obtaining NSA certification for the chip
- Received an Innovation Award for my efficient algorithm for key exchange (for frequency hopping sequences) in an ad hoc wireless network
- Improved efficiency of statistical tests of system performance through Importance Sampling and sophisticated Tail Modelling techniques
- Performed analysis of the new military GPS signal's response to ionospheric scintillation

Adjunct Instructor, Southern New Hampshire University ***06/2014 – 06/2016***

- Taught Statistics, Cryptology, and Financial Math using interactive online teaching protocols

Adjunct Instructor, Coe College, Kirkwood Community College, Des Moines Area Community College ***01/2000 – 12/2003***

- Taught undergraduate Astronomy, Physics, Calculus, Statistics, Algebra

Book Reviewer and Test Writer, Prentice Hall Publishing Company ***01/2001 – 08/2002***

- Identified as a top reviewer/proofreader and test-item writer for two college math texts

Temporary Assistant Professor, Iowa State University ***08/1994 – 12/2001***

- Taught a wide variety of undergraduate mathematics courses (Calculus 1, 2, and 3; Differential Equations with Laplace Transforms; Linear Algebra; Finite Math; Trigonometry)
- Was Course Supervisor for Finite Math (Matrix Algebra, Linear Programming, Probability)

- Measurably improved the performance of business majors in later math-related courses
- Improved student morale and performance using novel grading and testing methods

Assistant Professor, Valley City State University ***08/1992 – 05/1994***

- Taught: Calculus 1, 2, and 3; Advanced Calculus, Abstract Algebra, and more
- Participated in a faculty group exploring the use of Cooperative Learning in education
- Did astronomical calculations for a Stonehenge-like student project, the "Medicine Wheel"

Research Assistant, Iowa State University ***08/1991 – 08/1992***

- Researched image processing algorithms for image enhancement and feature detection
- Electrical Engineering Courses in Neural Networks and Computer Vision
- Published paper concerning my application of Neural Networks to image processing

Cryptologic Mathematician, Department of Defense ***01/1988 – 08/1989***

- Implemented many encryption and decryption algorithms
- Independently solved a long-standing cryptology problem. Published a classified paper presenting my algorithm to the intelligence community

EDUCATION

Ph.D., Mathematics, Iowa State University ***08/1992***

- Dissertation: "Loop Transversal Codes". I generalized the Hamming metric to non-white noise environments, proved that binary loop transversal codes are identical to lexicodes for all noise environments, and found record-breaking ternary codes.
- Published two papers and presented two conference talks based on my research

M.S., Mathematics, Iowa State University ***12/1987***

- Thesis: Extremely disconnected topologies and their algebraic rings of continuous functions.

B.S., Mathematics (Philosophy Minor), Iowa State University ***05/1985***

SKILLS

- Software: MATLAB, Excel, MSWord, PowerPoint, Doors, Zoom, MS Teams, PREP (collaboration software), Subversion (version control software)
- Technical: Both Pure and Applied Mathematics, Algorithm Development, Statistics, Monte Carlo testing, Cryptography, GPS, Wireless Networks
- Teaching: Online Instruction (Blackboard LMS), Student Engagement
- Soft Skills: Interdisciplinary Analysis, Creative Problem Solving, Clear Communication

RECOGNITIONS and ACTIVITIES

- Nominated for Teaching Excellence Awards,1991, 1994, 1997, 1998
- Delivered talks on
    - Philosophy of science issues, for ISU student philosophy group, 2000
    - Statistical issues in Parapsychology, ISU math colloquium, 1998
    - Philosophy of Science/Mind issues in Medicine, two health conferences, 1999, 2000
    - Theoretical Transport Capacity of Wireless Networks, Rockwell Collins, 2007
    - Important Sampling for reduction of variance and sample size, Rockwell Collins, 2010
    - The Mathematics of Musical Scales and Harmony, Rockwell Collins, 2012
- Wrote a Visual Basic Tool calculating planetary positions in many coordinate systems, 2005
- Author of a Science, Math, and Philosophy blog (www.FranksBus.com), exploring analytic thinking and interdisciplinary understanding, 2024 to present