CURRICULUM VITAE

Philip Beaver, Ph.D.
Colonel (Retired) United States Army
Professor of Business Analytics
Professor of Applied Mathematics
Professional Data Scientist and Business Analyst

Personal Information

Professor Phil Beaver
Daniels College of Business
DCB 589
2101 S. University Blvd.
Denver, Colorado 80208

303-871-4989
pbeaver@du.edu

Academic Degrees

• Doctor of Philosophy, Applied Mathematics, (Minor in Operations Research), Naval
    Postgraduate School, Monterey, CA, 1998.
• Master of Science, National Resourcing Strategy, (Financial Management Industry Study),
    Industrial College of the Armed Forces, National Defense University, Fort McNair,
    Washington, D.C., 2005.
• Master of Science, Applied Mathematics, Naval Postgraduate School, Monterey, CA, 1991.
• Bachelor of Science, United States Military Academy, West Point, NY, 1983.
    (Civil Engineering, Mechanical Engineering, and Mathematics)

Academic Experience

•Professor of Practice, Department of Business Information Analytics, Daniels College of
Business, University of Denver, Denver, Colorado, Fall 2015-Present
•Clinical Professor, Professor-in-Residence and Adjunct Lecturer, Department of Business
Information Analytics, Daniels College of Business, University of Denver, Denver, Colorado,
Fall 2010-Summer 2015
•Associate Professor, Department of Mathematical Sciences, United States Military Academy,
West Point, New York, 2001.
•Assistant Professor, Department of Mathematical Sciences, United States Military Academy,
West Point, New York, 1992-1994, 1998-2001.
•Instructor, Department of Mathematical Sciences, United States Military Academy, West Point,
New York, 1991-1992.

Professional Data Science and Business Analytics Experience

OGx Consulting, Chief Data Scientist, Denver, CO, 2016-present

Candidate Tools, Board of Advisors and Senior Data Scientist, Denver, CO, 2020-present

LDGR Capital Management, LLC, Data Science Advisor, NYC, NY, Jan 2018-present

DocBuddy, INC., Chief Data Officer and BOD, Greenwood Village, CO, 2014-present

Eagle River Group, Board Advisor, Denver, CO, 2020-Present

ProTechSure, Board of Advisors, Aurora, CO 2014-Dec, 2019
DataHype, Chief Data Scientist, Denver, CO, Jan – Dec, 2016
KeepLivin, Chief Analytic Officer, NYC, NY, Jan – Dec, 2016
Claremont Information Systems, INC., Chief Analytic Officer, Denver, CO, 2011-2012
  Patent, "System and Methods for Optimizing Real Estate Foreclosure Auction Pricing."
R.Index, (CO Holdings, LLC) Chief Data Scientist, Denver, CO and NYC, NY, 2012-2016
Cypress Partners, Chief Analytic Officer, Denver, CO 2012-2015

Business Analytics Consultant while at the University of Denver
•Claremont Information Systems, LLC, Denver, Colorado, 2010-2011
•BlackBox Logic, LLC, Denver, Colorado, 2010-2011
•Allonhill, LLC, Denver, Colorado, 2011-2012
•Government Sales, Inc, (GSISolutions.org), Denver, Colorado, 2010-2011
•CoorsTek, Golden, Colorado, 2009
•Denver Medical, Chief of Radiology, Denver, Colorado, 2011
•Secure Ideas, Denver, CO, 2013
•CoBank, Greenwood Village, Colorado, 2014
•ProTechSure, Aurora, Colorado, 2014
•Metrolist, Denver, Colorado, 2014
•Cengage Learning, Mason Ohio, 2012
•BrainTemp, INC. Englewood, CO 2014
•Crocs, Niwot, CO, 2012
•Horizon Coach Lines, Golden, CO, 2015
•San Manuel Indian Bingo & Casino, San Bernadino, CA, 2016
•Microstar, Denver, CO 2017
•WhiteWave, Broomfield, CO 2017
•Westmoreland Coal, Denver, CO 2018

Commercial Real Estate Professional
•**Libra Enterprises, LLC**, Santa Barbara, CA, BOD and Founding Partner, 1977-present.
•**Pacifica Real Estate Group**, Santa Barbara, CA, Minority Owner and BOD, 1991-present.
•**Beaver, INC**., Santa Barbara, CA, BOD, 1981-2020.

Service to the Department of Business Information and Analytics and the Daniels College of Business, University of Denver

Program Director for the MS in Business Analytics, beginning in AY2013-2014. Responsible for curriculum content and coordination, assurance of learning, and program updates through coordination with our Board of Advisors, faculty, and industry professionals.
I have conducted annual comprehensive curriculum reviews that resulted in six significant program and curricular changes. This included adding three courses to the program, re-designing two courses, and leading an AOL committee based on the capstone projects that has resulted in six major redesigns of the program sequence.

● Fully redesigned the STAT4610, Business Statistics, course for the MSBA program. This included adding a block on optimization (before we offered that as a course), and then including a block on project and process simulation (once optimization was offered).

● Fully redesigned the INFO4360, Complex Data Analytics, course for the MSBA program. This included creating a full set of SPSS Modeler tutorials for text mining, bringing in data sets from my professional organizations and consulting jobs, and creating 4 full projects in text mining and analysis. In 2016 we added "Big Data" to the course, and after two cycles of teaching Hortonworks Hadoop, we deployed (with UTS) our own Hadoop cluster. I created all of the instructional materials around this data and analytics ecosystem for Fall 2017.

● Created the course INFO4590, Optimization, for the MSBA program. Developed all of the course materials, secured a LINGO license, and brought in data from my professional organizations to create a relevant experience. During Academic Year 2019-2020, redesigned the course for Pyomo (The Python Optimization library).

● Created the course INFO4260, Data Management Platforms, for the MSBA program. Moved the Hadoop instruction from INFO4360 to INFO4260 to make room for social network analytics in INFO4360, and created new modules on cloud computing—specifically AWS and Azure. Included a block on "Ethics and Big Data" based on needs identified during the MSBA AOL process.

● Created the INFO4200 and INFO4400, Capstone Planning and Business Analytics Capstone, sequence. Developed all of the course materials, integrated professional development activities into the sequence, and created the presentation sequence as a professional development opportunity for all of the Analtyics students and faculty. Designed the advising experience to provide our faculty with more "real-world" analytics experiences. Created a sequence of Ethics activities and exercises that integrate real-world ethical considerations into the MSBA program.

● Fully redesigned the INFO 4100, Survey of Business Analytics, course in conjunction with an Adjunct Faculty member. Created over half of the course's instructional materials.

● Created the XMBA 4364, Data and Analytics, course for the EMBA program. Created the course from scratch, and performed 4 complete re-designs of the course until the material and deliverables were agreed to be appropriate for the executive audience.

● Created the Executive Education Data and Analytics course, in conjunction with Professor Amy Phillips. Completed a course re-design for 2018 when we split the course into two separate ExEd courses.

● Sequence Coordinator for INFO 4200, Capstone Planning, and INFO 4400, Capstone Course. Guide students through the analytic consulting process, coordinate with faculty advisors, and coordinate with corporate mentors for projects, to include conducting quality assurance for each project. Currently I am coordinating with over 500 companies, nonprofits, and governmental organizations to provide relevant analytic projects for our students. The Daniels MSBA is one of three programs in the country with individual, live-data, real-time capstones where the students consult on current projects with our partner organizations.

Academic Advisor for the MSBA students, to include full time, part time, certificate, and concentration students. Faculty Advisor to the MSBA Student Group. Internship Coordinator.

Serve on the Daniels College of Business Graduate Programs Committee.

Coordinate with Graduate Admissions for recruiting and candidate evaluation. Conduct webinars and hold meetings with MSBA candidates, attend recruiting events, and ensure our program materials and website are up-to-date.

Assurance of Learning coordinator for the Department (2012-2014) and for the MSBA (2012-present). Prepare and submit the Department's annual Assurance of Learning report through coordination with our program coordinators for the Undergraduate Analytics Core, Undergraduate Analytics Major, and the MSBA (which is also my continuing role as the MSBA coordinator). In the 2017 DCB AOL Instructional Video, my submission for the MSBA program was the one used as the example of how to perform and document an AOL program.

Led the Department's effort to develop the Undergraduate Core Analytics Sequence (INFO 1010, 1020, and 2020) to include complete development of curricular content, customized textbook design through our publisher, creating of the library of readings, development of instructional data sets, and production of all evaluation instruments, to include a program-comprehensive final exam to be used for assurance of learning and program evaluation. *I taught the core sequence through 2015, and mentored our adjunct and new faculty as they joined the sequence and assumed leadership roles in the program.*

Served on the committees to develop the MSBI and the undergraduate Analytics Major.

Developed and presented Executive Education seminars, and am continuing to coordinate with the Executive Education office to further these programs. Have taught for the Colorado Women's College, and the DCB PMBA and EMBA programs, to include development of new courses for the EMBA program, the PMBA program, and the Executive Education program.

University of Denver, Daniels College of Business Teaching Experience and Curriculum Development

2010 Fall	STAT 1400, Statistics II (X2)
2011 Winter	STAT 1400, Statistics II (X2)
2011 Spring	STAT 1300, Statistics I (X2)
2011 Fall	STAT 1400, Statistics II (X2)
2012 Winter	STAT 1400, Statistics II (X2)
	STAT 4610, Business Statistics (MBA Cohort)
2012 Spring	STAT 1400, Statistics II (X2)
2012 Fall	INFO 1010, Business Information and Analysis (X2) (Course Developer)
2013 Winter	INFO 1020, Business Information and Statistics (X2) (Course Developer)
	STAT 4610, Business Statistics (PMBA)
2013 Spring	INFO 2020, Business Modeling and Analytics (Course Developer)
	INFO 2025, Business Modeling and Analytics (CWC)
2013 Fall	INFO 2020, Business Modeling and Analytics (X2)
	Executive Education Course, Business Data and Analytics (with Amy Phillips)
2014 Winter	INFO 2020 Business Modeling and Analytics (X2)
	INFO 4200 Capstone Planning (Course Redesign)
	EMBA Business Analytics (Course Developer)
2014 Spring	INFO 2020, Business Modeling and Analytics
	INFO 2025, Business Modeling and Analytics (CWC)
	Executive Education Course, Business Data and Analytics (with Amy Phillips)
2014 Summer	INFO 4200, Capstone Planning
	INFO 4400, Capstone Course (Course Redesign)
	EMBA Business Analytics
2014 Fall	INFO 2020, Business Modeling and Analytics (X2)
	Executive Education Course, Big Data and Text Mining (with Bill Inmon)
	ITEC 4980, Internship (X2)
2015 Winter	INFO 2020, Business Modeling and Analytics (X2)
	INFO 4200, Capstone Planning
	INFO 4400, Capstone Course
	ITEC 4980, Internship (X3)
2015 Spring	INFO 2025, Business Modeling and Analytics (CWC)
	STAT 4610, Business Statistics (MSBA Students) (Course Redesign)
	INFO 4700, Optimization (Course Developer)
	INFO 4400, Capstone Course
	ITEC4980—Internship (X2)
	Executive Education Course, Business Data and Analytics (with Amy Phillips)
2015 Summer	INFO 4200, Capstone Planning
	INFO 4400, Capstone Course
	XMBA4364, Data and Analytics (EMBA)
	ITEC4980, Internship (X4)
2015 Fall	STAT 4610, Business Statistics (MSBA Students)
	INFO 4360, Complex Data Analytics (Course Redesign)
	XMBA 4364, Data and Analytics (EMBA)

	ITEC 4980, Internship (X1)
	Executive Education Course, Business Data and Analytics (with Amy Phillips)
	Executive Education Course, Human Resources Analytics
2016 Winter	INFO4590, Optimization
	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X5)
2016 Spring	STAT 4610, Business Statistics (MSBA Students)
	INFO 4360, Complex Data Analytics (Course Design)
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship
2016 Summer	INFO 4200, Capstone Planning
	INFO 4400, Capstone Course
	INFO 4590, Optimization
	ITEC4980, Internship (X6)
2016 Fall	STAT4610, Business Statistics (MSBA Students)
	INFO4360, Complex Data Analytics (Course Redesign)
	INFO 4400, Business Analytics Capstone
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X6)
2017 Winter	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	ITEC4980, Internship (X4)
2017 Spring	STAT 4610, Business Statistics (MSBA Students)
	INFO 4360, Complex Data Analytics (Course Redesign)
	XMBA 4364, Data and Analytics (EMBA) (Course Redesign)
	ITEC 4980, Internship (X3)
	INFO 4400, Capstone Course
	Executive Education Course, Business Data and Analytics (with Amy Phillips)
2017 Summer	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	INFO4590, Optimization (and INFO4591)
	ITEC4980, Internship (X7)
2017 Fall	STAT 4610, Business Statistics (X2)
	INFO 4360, Complex Data Analytics (Partial Course Redesign—Hadoop Cluster)
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X5)
	INFO 4400, Capstone Course
	Executive Education Course, Business Data and Analytics (with Amy Phillips)
2018 Winter	INFO4590, Optimization (X2) (and INFO4591)
	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	ITEC 4980, Internship (X3)
	Executive Education Course, Business Data and Analytics (with Amy Phillips)

2018 Spring	STAT 4610, Business Statistics
	INFO 4360, Complex Data Analytics
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X3)
	INFO 4400, Capstone Course
2018 Summer	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	INFO4590, Optimization
	ITEC4980, Internship (X4)
	Executive Education Course, Business Data and Analytics
2018 Fall	STAT 4610, Business Statistics (X2)
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X3)
	INFO 4400, Capstone Course
2019 Winter	INFO4590, Optimization (X2)
	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	ITEC 4980, Internship (X3)
	Executive Education Course, Business Data and Analytics
2019 Spring	STAT 4610, Business Statistics
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X5)
	INFO 4400, Capstone Course
2019 Summer	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	INFO4590, Optimization
	ITEC4980, Internship (X5)
	Executive Education Course, Business Data and Analytics
2019 Fall	**ON SABBATICAL**
	INFO4400, Business Analytics Capstone
	ITEC4980, Internship (X6)
2020 Winter	INFO4590, Optimization
	INFO4200, Capstone Planning
	INFO4400, Business Analytics Capstone
	ITEC 4980, Internship (X1)
	Executive Education Course, Business Data and Analytics
2020 Spring	**ON LINE**
	STAT 4610, Business Statistics (41 students)
	INFO 4260, Data Management Platforms (Course Design)
	XMBA 4364, Data and Analytics (EMBA)
	ITEC 4980, Internship (X2)
	INFO 4400, Capstone Course

2019 Summer **ON LINE**
INFO4200, Capstone Planning
INFO4400, Business Analytics Capstone
INFO4590, Optimization
ITEC4980, Internship (X1)

2020 Fall **HYBRID**
STAT 4610, Business Statistics (X2)
INFO 4260, Data Management Platforms
XMBA 4364, Data and Analytics (EMBA)
ITEC 4980, Internship
INFO 4400, Business Analytics Capstone

2021 Winter **ON LINE**
INFO4590, Optimization (X2)
INFO4200, Capstone Planning
INFO4400, Business Analytics Capstone
ITEC 4980, Internship (X2)
Executive Education Course, Business Data and Analytics

University of Denver and Daniels College of Business Advising Experience

AY 2014   Dissertation Committee, Seif Azgandi, "Regression analysis in Software Engineering," Anneliese Andrews Advisor, Department of Computer Science

AY 2014-15   Dissertation Committee, Joe Lucente, "On the Viability of Quantitative Assessment Methods in Software Engineering and Sortware Sciences," Anneliese Andrews Advisor, Department of Computer Science

2015 Winter   MSBA Capstone Advisor, Xinhui (Jennifer) Mao, "The Quality of Words Used by Real Estate Agents on the Multiple Listing Service," MetroList, Centennial, CO

2015 Spring   BSBA Analytics Major Capstone Advisor, Michael Degrandis, "An Optimization Model to Maximize Net Present Value of an Open-Pit Mine," MapTek, Lakewood, CO

2015 Summer MSBA Capstone Advisor, Jesse Daniel, "A Data System for Tracking Performance of On-Line Academic Instruction," University of Colorado, Boulder, CO

2016 Fall   MSBA Capstone Advisor, Dean Dominguez, "A Simulation Model to Forecast Personnel Turnover," Catholic Health Initiatives, Englewood, CO

2017 Winter   MSBA Capstone Advisor, Shihua Sun, "An Analysis of Officer Shift Scheduling for the Denver Police Department," Denver, CO

2017 Winter   MSBA Capstone Advisor, Dan Johnson, "An Analysis of Repeat Offender Behavior for the Denver Police Department," Denver, CO

2017 Winter   MSBA Capstone Co-Advisor, Anna Battugs, "An Aging Model for the Colorado Lawyer Population," Office of Regulatory Counsel, Colorado Supreme Court, Denver, CO

2017 Winter   MSBA Capstone Advisor, Mickey Rafa:
                      1) A Customer Segmentation Model for Terracare, Greenwood Village, CO
                      2) A Product-Use Analysis Model for Callan Associates, Denver, CO

2018 Winter   MSBA Capstone Advisor, Yuzhu Li, "Relationship of Crypto-Currency Fund Performance to other Financial Instruments," LDGR Capital Management, LLC, Denver, CO.

2020 Summer MSBA Capstone Advisor, Tongyao Liu, "A Risk Analysis Model for Insurance Contracts," Fortis Warranty, Denver, CO.

NOTE: While I run the MSBA Capstone Program, I only advise capstone projects by exception—in particular when there are issues with the Capstone Company or when I am the only faculty member qualified to advise the topic. However, I am the "back-up" advisor for all of the MSBA students, and have actively consulted for over 50% of all of our MSBA Capstone projects.

Other Advising Experience

United States Military Academy

AY94-2 "Investigation of Quasi-Chaotic Behavior in the Helmholtz Equations for Arbitrarily Large Frequencies." MA491 Capstone Project Advisor for Cadet David Orton.

AY94-2 "Object Identification in Greyscale Imagery Using Fractal Dimension." MA491 Capstone Project Advisor for Cadet Stephanie Quirk.

AY00 "Hegemony, Chaos, and Complexity." SS491 Capstone Project Co-Advisor (with Professor J. Parker) for Cadet Briana Simpson (Department of Social Sciences).

AY00-2 "Square Matrices Similar to Essentially Nonnegative Matrices." St. Cyr Academie Foreign Cadet Research Exchange for SLTs Geoffroy Desgress du Lou and Christophe Charlet.

AY00-2 "A Mathematical Model of a Complex Adaptive System." MA491 Capstone Project Advisor for Cadet Mary Oliastro.

AY01-2 "Flatland and Beyond." MA491 Capstone Project Advisor for Cadet Aaron Martin.

AY01-2 "Complex Adaptive Systems and Network Routing." MA491 Capstone Project Advisor for Cadet John Horton.

AY01-2 "The Hahn-Banach Theorem and the Axiom of Choice." MA491 Capstone Project Advisor for Cadet Barret Rhoden.

Naval Postgraduate School

AY97 "Prediction and Geometry of Chaotic Time Series." Master's Thesis Co-Advisor (with Professor C. Frenzen) for Captain Mary L. Leonardi, USMC.

United States Military Academy Teaching Experience

AY92-1   MA103, Discrete Dynamical Systems
AY92-2   MA104, Single Variable Calculus
AY93-1   MA205, Multivariable Calculus
AY93-2   MA206, Probability and Statistics
          MA385, Chaos and Fractals (Course Developer and Course Director)
AY94-1   MA205, Multivariable Calculus
AY94-2   MA206, Probability and Statistics
          MA385, Chaos and Fractals (Course Director)
          MA489, Advanced Topics in Nonlinear Dynamics (Course Dev and Director)
          MA491, Research Seminar in Applied Mathematics (Cadet Advisor X2)
AY99-1   MA103, Discrete Dynamical Systems and Introduction to Calculus
AY99-2   MA364, Engineering Mathematics
          MA385, Chaos and Fractals (Course Director)
          MA491, Research Seminar in Applied Mathematics (Course Director)
AY00-1   MA371, Linear Algebra (Course Director)
          MA491, Research Seminar in Applied Mathematics (Course Director)
          SS491, Research Seminar in International Relations (Cadet Co-Advisor)
AY00-2   MA387, Mathematical Analysis I (Course Director)
          MA491, Research Seminar in Applied Mathematics (Course Director)
          MA491, Research Seminar in Applied Mathematics (Cadet Advisor)
          SS491, Research Seminar in International Relations (Cadet Co-Advisor)
AY01-1   MA487, Mathematical Analysis II (Course Director)
          MA492D, Introduction to Graph Theory (Course Director)
          MA489, Advanced Topics in Mathematical Modeling and Programming
          (Course Developer and Course Director)
          MA491, Research Seminar in Applied Mathematics (Course Director)
AY01-2   MA485, Complex Variable Theory (Course Director)
          MA493D, Topology (Course Developer and Course Director)
          MA491, Research Seminar in Applied Mathematics (Course Director)
          MA491, Research Seminar in Applied Mathematics (Cadet Advisor X3)

Naval Postgraduate School Teaching Experience

AY96-4   MA4321, Stability, Bifurcations, and Chaos (Volunteer Teaching Assistant)
AY97-1   MA3610, Introduction to General Topology (Taught as a reading course)
AY97-2   MA0810, Thesis Research (Student Advisor)
AY97-3   MA0810, Thesis Research (Student Advisor)

Other Advising Experience

United States Military Academy

AY94-2   "Investigation of Quasi-Chaotic Behavior in the Helmholtz Equations for Arbitrarily Large Frequencies." MA491 Capstone Project Advisor for Cadet David Orton.

AY94-2   "Object Identification in Greyscale Imagery Using Fractal Dimension." MA491 Capstone Project Advisor for Cadet Stephanie Quirk.

AY00   "Hegemony, Chaos, and Complexity." SS491 Capstone Project Co-Advisor (with Professor J. Parker) for Cadet Briana Simpson (Department of Social Sciences).

AY00-2   "Square Matrices Similar to Essentially Nonnegative Matrices." St. Cyr Academie Foreign Cadet Research Exchange for SLTs Geoffroy Desgress du Lou and Christophe Charlet.

AY00-2   "A Mathematical Model of a Complex Adaptive System." MA491 Capstone Project Advisor for Cadet Mary Oliastro.

AY01-2   "Flatland and Beyond." MA491 Capstone Project Advisor for Cadet Aaron Martin.

AY01-2   "Complex Adaptive Systems and Network Routing." MA491 Capstone Project Advisor for Cadet John Horton.

AY01-2   "The Hahn-Banach Theorem and the Axiom of Choice." MA491 Capstone Project Advisor for Cadet Barret Rhoden.

Naval Postgraduate School

AY97   "Prediction and Geometry of Chaotic Time Series." Master's Thesis Co-Advisor (with Professor C. Frenzen) for Captain Mary L. Leonardi, USMC.

Curriculum Development, United States Military Academy

Created the course MA385, Chaos and Fractals, based on student demand in AY93. Wrote the original text for the course (Fractals and Chaos) as a directed Master's Thesis, which has been used as a text in at least three departments at other institutions. Developed the syllabus, all exercises, problem sets, and projects. The course was taught in this format until AY97, when a new text was adopted.

Created the course MA489, Advanced Topics in Nonlinear Dynamics, in AY94.

Created the course MA489, Advanced Topics in Mathematical Modeling and Programming, based on student demand in AY01.

As the course director for MA371 (Linear Algebra), MA387 (Mathematical Analysis I), MA485 (Complex Variable Theory) and MA492D (Introduction to Graph Theory), all of which were frequently-taught courses, re-wrote the syllabi based on previous course-end reports, and entered course-end reports into the Department's continuity files for improving curriculum development.

As the course director for MA385 (Chaos and Fractals), MA489 (Advanced Topics in Nonlinear Dynamics), MA489 (Advanced Topics in Mathematical Modeling and Programming), MA 487 (Mathematical Analysis II), MA493D (Topology) and MA493E (Functional Analysis), all of which were rarely-taught or new courses, developed the syllabi from scratch, and entered course-end reports into the Department's continuity files for improving curriculum development.

From AY99-AY01 developed and refined the Mathematics and Operations Research cadet capstone course, MA491, Research Topics in Applied Mathematics. This model was shared through interdisciplinary capstone projects with the Department of Social Sciences, the Department of Systems Engineering, the Department of Civil and Mechanical Engineering, and the Department of Electrical Engineering and Computer Sciences.

In AY94 served on the Department's MA104 applications and development committee. Authored a collection of projects for the course.

In AY00 served on an *ad hoc* Math-Science-Engineering subcommittee for coordinating cadet research topics and individual studies courses among MSE cadets.

During AY94 consulted for The College Board, and worked on a committee that developed a high school education module that was designed to teach predictability, uncertainty, nonlinear dynamics, and chaos at the high school level.

Selected Publications

Lucente, J., A. Andrews, and P. Beaver, "Towards Better Help Desk Planning: Predicting Incidents and Required Effort," *Journal of Systems and Software*, **117**, July 2016, 426-449.

Urbaczewski, A., and P. Beaver, "Learning and Education: a Paradigm Shift in the Age of Internet and Search Engines," *Journal of Information Technology Case and Application Research*, 17:3-4, 124-129, DOI: 10.1080/15228053.2015.1077669, December, 2015.

Toney, S and P. Beaver, "A Comprehensive Analytics (Statistics, Data, and Technology) Sequence for Business Students," *Proceedings of the American Statistical Association Joint Statistical Meetings*, Section of Statistical Education, 2013.

Beaver, P. and D. Canright, "The Quasimonotonicity of Linear Differential Systems – The Complex Spectrum," *Applicable Analysis*, **80**, 2001, 127-131.

Beaver, P. and D. Canright, "The Quasimonotonicity of Linear Differential Systems," *Applicable Analysis*, **70** (1-2), 1998, 67-73.

Beaver, P., S. Quirk, and J. Sattler, "Object Identification in Greyscale Imagery Using Fractal Dimension," *Fractal Reviews in the Natural and Applied Sciences* (M. M. Novak ed.) Chapman and Hall, New York, 1995.

Beaver, P., et. al., *Predictability: From Uncertainty to Chaos, Student Activity Guide*, The College Board, New York, 1994.

Beaver, P., et. al., *Predictability: From Uncertainty to Chaos, Teacher's Guide*, The College Board, New York, 1994.

Beaver, P., "A Project that Worked?" *Mathematica Militaris*, **9** (1) Spring 1999, 9-10.

Beaver, P., "Make Way for Technology!" *Mathematica Militaris*, **9** (3) Fall 1999, 2-4.

Beaver, P., D. Matty, and M. Phillips, "Mathematical Research Programs at West Point in Support of the Army," *Mathematica Militaris*, **10** (1), Spring 2000, 17-19.

Beaver, P., "Digitization of the Battlefield—Problems and Issues," Proceedings of the 4th Annual Army Conference on Applied Statistics, Army Research Laboratory, February 1999.

Beaver, P., "Digitization of the Battlefield," *Proceedings of the 6th Annual ARL/USMA Technical Symposium*, 4-6 November 1998, USMA MSC#, 29-30.

Beaver, P., "Overheard in a Bar," *The Pi Mu Epsilon Journal*, **11** (3) Fall 2000, 138.

Beaver, P. and J. Shupenus, An Analysis of Transmission Times on the Digitized Battlefield, Department of Mathematical Sciences Technical Report, West Point, NY, 28 April 1999.

Beaver, P., An Analysis of the USSOCOM Strategy-to-Task Assessment Model, Department of Mathematical Sciences Technical Report, West Point, NY, 5 October 1999.

Beaver, P., *On the Quasimonotonicity of a Square, Linear Operator with respect to a Nonnegative Cone*, Naval Postgraduate School Doctoral Dissertation, 1998.

Beaver, P., *Fractals and Chaos*, Naval Postgraduate School Master's Thesis, 1991.

Chapter Reviewer for: Cochran, J.J., D.R. Anderson, et. al., *Essentials of Business Analytics*, Cengage Learning, Stamford, CT, 2015.

Conference Governance

Site Coordinator, 5th U.S. Army Conference on Applied Statistics, West Point, NY 18-21 October 1999.

Site Coordinator and Host, 11th Annual Service Academy Student Mathematics Conference, 12-14 April 2001.

Local Organizer, Hudson River Undergraduate Mathematics Conference.

Department Representative, Service Academy Student Mathematics Conference.

Selected Presentations

"Using Machine Learning and AI for Multifamily Residence Marketing," Digible Summit keynote speaker, Denver, CO, August 19, 2019.

"State of the Denver Data Science Community," Denver Startup Week Invited Panelist, Denver, CO, September 24, 2018.

"Counter-Terrorism, Marketing, and Big Data," 2018 Police and Science International Forum on Counter-Terrorism and Governance of Emerging Crimes in the Era of Big Data, Hangzhou, China, June 19-22, 2018.

"Object Identification in Greyscale Imagery using Fractal Dimension," Third IFIP Conference on Fractals in the Natural and Applied Sciences ("Fractal 95 Conference"), Marseille, France, 7-10 February 1995.

Digitization of the Battlefield—Problems and Issues," Fourth US Army Conference on Applied Statistics, Las Cruces, New Mexico, 18-20 October 1999.

"Chaos, Complexity, and International Relations," International Studies Association 41st Annual Convention ("ISA 2000 Conference"), Los Angeles, CA, 14-18 March 2000, with J. Parker and B. Simpson.

"A Linear Model to Support USSOCOM's Strategic Planning Process," 68th MORS Symposium, USAFA, Colorado Springs, CO, 20-22 June 2000, with S. Horton.

"A Problem in Optimization and Simulation in Army Personnel Forecasting," 72d MORS Symposium, Naval Postgraduate School, Monterey, CA, June 2004.

"An Optimization Model for Army Personnel Forecasting," 10th Annual Korea-US Military Analysis Conference, Seoul, Korea, April 2003.

"Army Enlisted Personnel Management," 7th Annual British-American Forecasting Exchange," Stratford-on-Avon, UK, June 2003.

"Chaos in Quadratic Systems," University of Missouri, Kansas City, Department of Mathematics Expository Talk Series, 31 March 1995.

"Chaos in More than One Dimension," USMA Department of Mathematical Sciences Math Awareness Day Keynote Lecture, 7 April, 2000.

"Chaos and Fractals," USMA Department of Mathematical Sciences Mathematics Forum Invited Lecture, 24 October 2000.

"Big Data and Analytics in Business," Rotary Club of University Hills, 2014.

"Data and Analytics in Sports," Rotary Club of University Hills, 2015.

"The 9/11 Attack on the Pentagon, an Insider's Story." Delivered to over 20 civic organizations from 2009 through 2018 in Colorado and California.

Media Presentations

"DU Professor Philip Beaver Recalls 9/11 Attack on the Pentagon," 7News, Denver, September 11, 2015.

"Verify: How much beer can Americans drink on Super Bowl Sunday?" 9News, Denver, February 7, 2017.

Service to the Department of Mathematical Sciences, USMA

Director, Mathematical Sciences Center of Excellence, AY99-01.
     Director of faculty and cadet research.
     Run the Department's Academic Individual Advanced Development (AIAD) program.
     Department Representative to the Service Academy Student Mathematics Conference.
     Publish *In the Lead*, the Department's Annual Research Report.
     Write the Department's contribution to the Dean's Annual Research Report.
     Manage and maintain faculty and cadet research publications and technical reports.
Editor-in-Chief, *Mathematica Militaris*, the Journal of the Service Academy Mathematics
     Departments, AY99-01, and also served as Managing Editor, AY01.
Member, Editorial Board, ARL/USMA Technical Symposium Proceedings AY00-01.
Colloquium coordinator, Department of Mathematical Sciences, AY93-94.
Research colloquium coordinator in conjunction with the Department's Center for Faculty
     Development, AY99-01.
West Point Distinguished Lecturer Series Committee representative from the Department of
     Mathematical Sciences, AY92-94. (Lecture host, AY93.)
MSE Committee and USMA POC for "West Point Projects Day," 4 May 2000.
Self-Appointed Department Librarian.

Student Development and Service, Department of Mathematical Sciences, USMA

Served as a Fourth Class (Freshman) Mentor for classes of 1995 and 2002.
Faculty Representative for the Women's Volleyball Team, AY93-94.
Faculty Representative and Assistant Coach of the Cadet Cycling Team, AY00-01.
Cadet Honor Education Team member, AY93-94.
Cadet Values Education member, AY00-01.
Academic Counselor for a cadet company, AY92-93.
Department AIAD coordinator, AY99-00.
Taught Military Science 102 during Winter Intersession, AY92-93.
Taught Military Science 202 during Winter Intersession, AY 99-00.
Ran an Infantry Committee site for Cadet Field Training, Summer 1992.
Served as a Company Trainer for Cadet Field Training, Summer 2000.

Awards and Honors

Graduated from United States Military Academy as a Distinguished Cadet (top 5%) 1983.
Selected and initiated into the Honor Society of Phi Kappa Phi, 1983.
Graduated with Distinction, Naval Postgraduate School, 1991.
Received the William R. Church Award for excellence in mathematics, NPS, 1991.
Selected and initiated into the Scientific Research Society Sigma Xi, 1991.
Received Phi Kappa Phi Scholastic Achievement Award, 1992.
Received Phi Kappa Phi Scholastic Achievement Award, 1993.
Selected and initiated into the National Honorary Mathematics Fraternity, Pi Mu Epsilon, 1999.

Memberships: MAA, AMS, SIAM, MORS, Sigma Xi, Phi Kappa Phi, Pi Mu Epsilon, ASCAP.

Operations Research and Analytic Consulting while at USMA

Consulted for the following organizations as a member of the Department of Mathematical Sciences, USMA. This list includes Summer Research Fellowships in addition to funded research positions during the academic years.

Army Research Laboratory, Sensors, Signals, Signatures, and Information Processing Directorate, Adelphi, MD. *Worked on the problem of object identification in grayscale imagery using fractal dimension, 1993-1995.*

Army Digitization Office, the Pentagon. *Led a research cell of 8 Department members in conducting research on digitization of the battlefield, AY99.*

Army Digitization Office, the Pentagon. *As the Department's Director of Research, coordinated a research partnership with ADO that included 14 faculty members working on three separate projects, and was funded for $21,000.*

Warfare Analysis Integration Center, Alexandria, VA. *Provided statistical analysis of digitized transmission times to the WAIC for use in the ADO presentation to Congress on battlefield digitization.*

United States Special Operations Command, MacDill AFB, FL. *Provided analysis on the Strategy-to-Task Assessment Model (STAM) used by USSOCOM to weight and prioritize tasks based on the National Security Strategy. Wrote a model to take the STAM output and determine program funding for USSOCOM, 1999.*

Deputy Chief of Staff for Personnel, the Pentagon. *Participated as part of a team with the Department of Operations Research and Systems Analysis to provide analysis for the Chief of Staff force manning study. Worked with the same group on the enlisted force structure requirements by providing modeling, verification, and validation for their effort, AY00.*

The College Board, New York, NY. *As part of a team of consultants, developed a module for teaching predictability, uncertainty, and chaos to high school students. Was the primary author of the two published modules (the Student Activity Guide and the Teacher's Guide) 1994.*

O'Neill High School, Highland Falls, NY. *Consulted for mathematics curriculum development in the use of spreadsheets in mathematical modeling.*

As Director of Faculty and Cadet Research for the Department of Mathematical Sciences, maintained outreach contact with the US Army Aberdeen Test Center, the Topographic Engineering Center, STRICOM, OSD DOT&E, and NASA. Established Cadet and Faculty research fellowships with over a dozen agencies, including the ones listed here.

Army Research Office, Research Triangle Park, NC. *Board of Advisors, serving while a Senior Analyst on the Joint Staff in the Pentagon, 2008.*

The Joint Staff, Pentagon, Washington D.C., Branch Chief and Senior Analyst, 2005-2008
Responsible to the Chairman of the Joint Chiefs of Staff for analysis of Department of Defense force structure, to include analyzing force sufficiency to meet the National Defense Strategy.
>•Ran the Department of Defense's rotation study, which was the capstone study for the Quadrennial Defense Review.
>•Coordinated analytic results with the four Services, the Joint Staff, and the Office of the Secretary of Defense, resulting in recommendations that led to significant changes in future programmed force structure.
>•Developed and managed a $4 million contract for the Department of Defense force structure analysis tool. Provided the government specifications for the model and ensured the delivered product met the government's requirements.
>•Served as the project lead for the "Global Force Management Data Initiative," a program that codified Service authorization data as the cornerstone for building the Department of Defense's Global Information Grid.

The Army Staff, Pentagon, Washington, D.C., Branch Chief and Senior Analyst, 2001-2004
Responsible for the Army's enlisted personnel strength forecasting. Conducted the analysis that drove the Army's recruiting, assignment, retention, promotion, separation, stop-loss, reclassification, and initial-entry training programs.
>•Served as the Government Program Manager and Technical Lead for the development and maintenance of the Enlisted Grades and Enlisted Specialties models, a $25 million suite of models used for personnel strength forecasting.
>•Briefed Congressional committees to support the $38 billion Army Personnel budget.
>•Developed the program to increase the Army's personnel strength to support the Global War on Terror in March, 2003. The President and Secretary of Defense approved the plan, Congress funded it, and it remained in place through July, 2009.
>•After the 9/11 attack on the Pentagon, had the Branch back to work by 9/13 in temporary spaces, and recovered our servers from the Pentagon, allowing the Branch to be fully operational by the following Monday, 9/17.

United States Army Infantry Officer (1983-2008)
Served as a commissioned officer in the United States Army for over 25 years, retiring as a Colonel. In addition to the positions above, served in the following as an Infantry officer.
82d Airborne Division, Fort Bragg, North Carolina, 1983-1987
>•Rifle Platoon Leader •Support Platoon Leader
>•Company Executive Officer •Battalion Operations Officer

2d Infantry Division, Camp Greaves, Korea, 1987-1989
>•Battalion Adjutant/Personnel Officer •Rifle Company Commander

Military Awards and Decorations
>•Legion of Merit •Meritorious Service Medal (4)
>•Joint Service Commendation Medal •Army Commendation Medal
>•Army Achievement Medal (2) •National Defense Service Medal (2)
>•Global War on Terror Service Medal •Korean Defense Service Medal
>•Army Service Ribbon •Overseas Service Ribbon
>•Expert Infantryman Badge, Ranger Tab, Senior Parachutist Badge