Mark Betnel

Teacher, physicist, philosopher, programmer, tinkerer

I like to figure things out and then to help others figure them out too.

Education

2005-2011 **PhD, Physics**; Boston University (Boston, MA)

Thesis: Computational study of protein folding and assembly in Alzheimer's and Parkinson's diseases

Advisor: Brigita Urbanc, Department of Physics, Drexel University

2003-2005 **MS, Physics**; University of Rhode Island (Kingston, RI)

Advisor: Gerhard Mueller

1999-2001 **MA, Philosophy**; San Francisco State University (San Francisco, CA)

Thesis: Moral agency in a propaganda system

Advisor: Gus Bagakis

1994-1998 **BS, Physics**; Harvey Mudd College (Claremont, CA)

Thesis: Construction of a broadband force-feedback seismometer

Advisor: Greg Lyzenga

Minor: Literature and Philosophy

Teaching Experience

2013-current: Upper School Science & Math Teacher, Seattle Academy of Arts & Sciences

- Lead teacher for project-based, 9th grade level "Scientific Investigation" course
- Lead teacher for 12th grade Physics
- Created new advanced track of calculus-based physics
- Teach in the Algebra 2/3 sequence

2011-2013: Assistant Professor of Math and Science, Johnson & Wales University

- Taught Intro to College Math, Discrete Mathematics, algebra-based Physics I and II, calculus-based Physics I and II, Quantitative Analysis, Organic Chemistry, Algebra, Precalculus, and Science & Civilization
- Developed new lab courses for the general and advanced physics sequences
- Developed curriculum for Ethics in Technology course
- Worked with Science department to develop a new biology major

- Lead effort to assess written communication in upper level science courses
- Taught online course

2011: Adjunct faculty, Wentworth Institute of Technology

- Taught Introductory Chemistry and Introductory Physics labs

2008-2009: Graduate Writing Fellow, Boston University

- Taught WR100 and WR150, Freshman Writing Seminar
- Developed curriculum on writing about science for a popular audience

2007-2008: National Science Foundation GK-12 Fellow

- Taught at an urban Boston high school
- Developed engineering and physics curriculum

2005-2007: Teaching Fellow, Boston Unversity

- Recitation and lab sections in Modern Physics, Electricity & Magnetism
- Gave guest lectures in Modern Physics
- Course grader for undergraduate and graduate courses in Mathematical Methods, Computational Physics, Statistical Mechanics II, and Solid State Physics
- Awarded Teaching Fellow of the Year Award in 2007

2003-2005: Teaching Assistant, University of Rhode Island

- Taught lab sections of Introductory and Advanced Mechanics
- Wrote new lab manuals for Introductory Mechanics
- Lead technical skills seminars for new graduate students

2002-2003: Integrated Science Teacher, Evergreen Valley High Schol

- Taught 10th grade integrated science

1999-2002: Teaching Assistant, San Francisco State University

- Taught Critical Thinking
- Developed online course materials and organized tutorial sessions for Formal Logic
- Grader and assistant for Formal Logic, Philosophy of Science, Ancient Philosophy, Medieval Philosophy

1998-1999: Math Teacher, East Union High School

- Taught Algebra I
- Assistant varsity soccer coach

Technical & Research Experience

Biophysics Used discrete molecular dynamics to simulate folding and assembly of proteins related to Alzheimer's and Parkinson's diseases

- Software development, use, and maintenance in C++, Python, VMD, Gromacs, TCL, R.
- Developed analysis and visualization software in Python and R

- Studied biophysics of folding and assembly in disordered proteins and effective interaction potentials
- Brigita Urbanc, Drexel University

Quantum Information Theory

Investigated the use of coherent states of light as storage and transmission media for continuous variable quantum information

- Simulated quantum algorithms and coherent states using Mathematica and Python
- Gregg Jaeger, Boston University; Gerhard Mueller, University of Rhode Island

Standards Based Grading

Developed a command-line gradebook program to facilitate data entry for standards-based grading

Geophysics

Instrument design and tracking crust motion

- Assisted in the design and construction of a broadband force-feedback seismometer
- Used GPS anntenae to track long-term crust motion in the Los Angeles basis
- Circuit design and fabrication; mountaineering; data analysis
- Greg Lyzenga, Harvey Mudd College

Publications

Peer Reviewed

- Urbanc, B., **M. Betnel**, L. Cruz, H. Li, E.A. Fradinger, B.H. Monien, G. Bitan. Structural basiis for Aβ(1-42) toxicity inhibition by Aβ C-Terminal fragments: Discrete Molecular Dynamics Study, Journal of Molecular Biology 410 (316), 2011.
- Urbanc, B., **M. Betnel**, L. Cruz, G. Bitan, D. Teplow. Elucidation of Amyloid β-Protein Oligomerization Mechanisms: Discrete Molecular Dynamics Study, Journal of the American Chemical Society 132 (4266), 2010.
- **M. Nelson**, Moral agency in a propaganda system, Discourse 8, 2002.

Other Publications

- **Betnel, M.**, N.V. Dokholyan, B. Urbanc. "From disordered amyloid β-proteins to soluble oligomers and protofibrils using Discrete Molecular Dynamics", in **Alzheimer's disease: Molecular basis of amyloid protein aggregation and cytotoxic aggregates from computer simulations**, Molecular Medicine and Medicinal Chemistry 7, Part B, Ch. 12 333-358, Ed. P. Derreumaux, Imperial College Press (2013).
- **M. Nelson**, *Introductory Laboratory Manual, Physics 111-112*. University of Rhode Island Department of Physics, 2004.

Invited Talks

- "Computational study of protein folding and assembly in Alzheimer's disease". Brown University, Biological Physics Journal Club, Providence, RI. April 20, 2011.
- "Computational study of protein folding and assembly in Alzheimer's disease". Brown University, Department of Physics}, Providence, RI. December 15, 2010.
- "Moral agency in a propaganda system". St. Thomas Episcopal Church, Sunnyvale, CA. January 10, 2002.

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