CURRICULUM VITAE

Gregory J. Crowther, Ph.D.
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Appointments

2018- Instructor (Life Sciences), Everett Community College (WA)

2014- Lecturer/Affiliate Instructor (Biological Sciences), University of Washington Bothell

2008-2014 Acting Faculty (Biology, English, and Medicine), University of Washington (Seattle)

2002-2003 Visiting Assistant Professor (Biology), University of Puget Sound (Tacoma, WA)

Education and training

2016-2017 M.A. in Teaching (Science Education), Western Governors University
- Adviser: Carla Phillips, M.Ed.

2003-2007 Postdoctoral fellowship in Chemical Engineering/Microbiology, University of Washington (Seattle)
- Adviser: Mary E. Lidstrom, Ph.D.

1995-2002 Ph.D. in Physiology & Biophysics, University of Washington (Seattle)
- Advisers: Kevin E. Conley, Ph.D., and Martin J. Kushmerick, M.D., Ph.D.

1991-1995 B.A. in Biology, Williams College (Williamstown, MA)
- Adviser: Daniel V. Lynch, Ph.D.

Teaching

2018- Everett Community College (WA)
- Biology 231: Human Anatomy
- Biology 232: Human Physiology

2014- University of Washington Bothell (WA)
- Biology 180: Introductory Biology (labs only)
- Biology 241-242: Human Anatomy & Physiology
- Biology 351-352: Principles of Anatomy & Physiology
- Biology 498: Independent Study in Biology
- Biology 499: Undergraduate Research in Biology

2014-2015 South Seattle College (WA)
- Biology 241: Human Anatomy & Physiology

2003-2014 University of Washington (Seattle, WA)
- Biology 220: Introductory Biology
- Biology 485: Drug Discovery for Infectious Diseases
- Biology 499: Undergraduate Laboratory Research
- Chemical Engineering 355/599: Biological Frameworks for Engineers
- Electrical Engineering 400/546: Biological Frameworks for Engineers
- English 299: Intermediate Interdisciplinary Writing in the Natural Sciences
- Mechanical Engineering 498/598: Biological Frameworks for Engineers
- Microbiology 496: Library Research Project

2002-2003 University of Puget Sound (Tacoma, WA)
- Biology 212: Cell Biology
- Biology 334: Comparative Animal Physiology

Research interests

2019- Transparent alignment of biology activities, learning outcomes, and assessments
- Developing Test Question Templates (TQTs) to promote creative practice aligned to tests

2004-2019 Integration of the arts into STEM education
- Created musical interventions and tested effects on student attitudes and learning

2007-2014 Drug discovery for malaria and other infectious diseases
- Developed assays for high-throughput screening of chemical libraries
- Identified compounds' possible targets with biochemical and biophysical methods
- Prioritized possible drug targets using bioinformatic criteria

2003-2007 Central metabolism of methylotrophic bacteria
- Studied mechanisms of switching between one-carbon and multi-carbon substrates
- Measured pathway fluxes, enzyme activities, and metabolite concentrations
- Improved a kinetic model of methylotrophic metabolism

1996-2002 Energy metabolism of human muscle cells
- Tested hypotheses on the control of glycolytic flux in vivo
- Measured changes in intracellular metabolite levels using NMR spectroscopy
- Calculated lactate production and ATP turnover from changes in metabolites

1993-1995 Sphingolipid metabolism of plant cells
- Studied sphinganine kinase in corn and bean tissue
- Measured enzyme activity in vitro with radiolabeled substrates

Peer-reviewed papers

In review G.J. Crowther et al. Teaching science with the "universal language" of music: alignment with the Universal Design for Learning framework. In review.

2023 G.J. Crowther et al. A simple method possible for predicting a molecule's biological properties from its polarity. *CourseSource* **10**: in press.

D.P. Evans et al. Student perceptions of a framework for facilitating transfer from lessons to exams, and the relevance of this framework to published lessons. *Journal of Microbiology and Biology Education* **24**: in press.

G.J. Crowther and T.A. Knight. Using Test Question Templates (TQTs) to teach physiology core concepts. *Advances in Physiology Education* **47**(2): 202-214.

2021 G.J. Crowther. How do kidneys make urine from blood? Qualitative and quantitative approaches to filtration, secretion, reabsorption, and excretion. *CourseSource* **8**: 42.

P.A. Halpin and G.J. Crowther. Tunes in the zoom room: remote learning via videoconference discussions of physiology songs. *Journal of Microbiology and Biology Education* **22**(1): 2529. [special issue]

2020 G.J. Crowther et al. Is memorization the name of the game? Undergraduates' perceptions of the usefulness of physiology songs. *Advances in Physiology Education* **44**(1): 104-112.

G.J. Crowther et al. Testing in the age of active learning: Test Question Templates help to align activities and assessments. *HAPS Educator* **24**(1): 74-81.

2018 T. Caraballo and G. Crowther. Idea bank: the protein résumé. *The Science Teacher* **85**(4): 14-16.

H. Vu et al. Fragment-based screening of a natural product library against 62 potential malaria drug targets employing native mass spectrometry. *ACS Infectious Diseases* **13**(4): 431-444.

S.J. Ward et al. Songwriting to learn: how high school science fair participants use music to communicate personally relevant scientific concepts. *International Journal of Science Education, Part B* **8**(4): 307-324.

2017 G.J. Crowther. Which way do the ions go? A graph-drawing exercise for understanding electrochemical gradients. *Advances in Physiology Education* **41**: 556-559.

G.J. Crowther. Teaching the core concepts of physiology: what, why, and how. *CBE-Life Sciences Education* **16**: fe7. [book review]

G.J. Crowther et al. Songwriting to learn: can students learn A&P by writing content-rich lyrics? *HAPS Educator* 21(2): 119-123.

2016 G.J. Crowther et al. Leveraging the power of music to improve science education. *International Journal of Science Education* **38**(1): 73-95.

G.J. Crowther et al. Biochemical screening of five protein kinases from *Plasmodium falciparum* against 14,000 cell-active compounds. *PLoS ONE* **11**: e0149996.

2015 G.J. Crowther et al. The bacterial Sec pathway of protein export: screening and follow-up. *Journal of Biomolecular Screening* **20**: 921-926.

G.J. Crowther et al. Integration of math jingles into physiology courses. *Journal of Mathematics Education* **8**(2): 56-73. [special issue]

T. Li et al. High-throughput screening against thioredoxin glutathione reductase identifies novel inhibitors with potential therapeutic value for schistosomiasis. *Infectious Diseases of Poverty* **4**: 40.

2014 G.J. Crowther and R.M. Price. Re: Misconceptions are “so yesterday!” *CBE Life Sciences Education* **13**: 3-5. [letter to the editor]

G.J. Crowther et al. Cofactor-independent phosphoglycerate mutase from nematodes has limited druggability, as revealed by two high-throughput screens. *PLoS Neglected Tropical Diseases* **8**: e2628.

2013 G.J. Crowther and K. Davis. Amino Acid Jazz: amplifying biochemistry concepts with content-rich music. *Journal of Chemical Education* **90**: 1479-1483.

G.J. Crowther et al. Making material more memorable . . . with music. *American Biology Teacher* **75**: 713-714. [invited]

H. Vu et al. *Plasmodium* gametocyte inhibition identified from a natural product-based fragment library. *ACS Chemical Biology* **8**: 2654-2659.

2012 G. Crowther. Using science songs to enhance learning: an interdisciplinary approach. *CBE Life Sciences Education* **11**: 26-30. [review]

G.J. Crowther. The SingAboutScience.org database: an educational resource for instructors and students. *Biochemistry and Molecular Biology Education* **40**: 19-22.

G.J. Crowther et al. A mechanism-based whole-cell screening assay to identify inhibitors of protein export in *E. coli* by the Sec pathway. *Journal of Biomolecular Screening* **17**: 535-541.

M.P. Magarinos et al. TDR Targets: a chemogenomics resource for neglected diseases. *Nucleic Acids Research* **40**: D1118-D1127.

2011 G.J. Crowther et al. Identification of inhibitors for putative malaria drug targets among novel antimalarial compounds. *Molecular and Biochemical Parasitology* **175**: 21-29.

S.N. Hewitt et al. Expression of proteins in *Escherichia coli* as fusions with maltose-binding protein to rescue non-expressed targets in a high-throughput protein-expression and purification pipeline. *Acta Crystallographica Section F* **67**: 1006-1009. [special issue]

2010 G.J. Crowther et al. Use of thermal melt curves to assess the quality of enzyme preparations. *Analytical Biochemistry* **399**: 268-275.

G.J. Crowther et al. Identification of attractive drug targets in neglected-disease pathogens using an in silico approach. *PLoS Neglected Tropical Diseases* **4**: e804.

W.A. Guiguemde et al. Chemical genetics of *Plasmodium falciparum*. *Nature* **465**: 311-315.

E. Skovran et al. A systems biology approach uncovers cellular strategies used by *Methylobacterium extorquens* AM1 during the switch from multi- to single-carbon growth. *PLoS ONE* **5**: e14091.

2009 G.J. Crowther et al. Buffer optimization of thermal melt assays of *Plasmodium* proteins for detection of small-molecule ligands. *Journal of Biomolecular Screening* **14**: 700-707.

2008 F. Agüero et al. Genomic-scale prioritization of drug targets: the TDR Targets database. *Nature Reviews Drug Discovery* **7**: 900-907.

G.J. Crowther et al. Formate as the main branchpoint for methylotrophic metabolism in *Methylobacterium extorquens* AM1. *Journal of Bacteriology* **190**: 5057-5062.

2007 L. Chistoserdova et al. Identification of a fourth formate dehydrogenase in *Methylobacterium extorquens* AM1 and confirmation of the essential role of formate oxidation in methylotrophy. *Journal of Bacteriology* **189**: 9076-9081.

G.J. Crowther et al. Molecular and cell biology: an engineering perspective. In: G. Alterovitz and M. Ramoni, eds. *Systems bioinformatics: an engineering case-based approach.* Artech House Publishers. [invited]

2006 G. Crowther. Learning to the beat of a different drum: music as a component of classroom diversity. *CONNECT* **19**(4): 13-15. [invited/special issue]

2005 M.G. Kalyuzhnaya et al. Analysis of gene islands involved in methanopterin-linked C_1 transfer reactions reveals new functions and provides evolutionary insights. *Journal of Bacteriology* **187**: 4607-4614.

2003 G.J. Crowther et al. Altered energetic properties in skeletal muscle of men with well-controlled insulin-dependent (type 1) diabetes. *American Journal of Physiology* **284**: E655-E662.

2002 G.J. Crowther and R.K. Gronka. Fiber recruitment affects oxidative recovery measured in human skeletal muscle in vivo. *Medicine and Science in Sports and Exercise* **34**: 1733-1737.

G.J. Crowther et al. The control of glycolysis in contracting skeletal muscle. I. Turning it on. *American Journal of Physiology* **282**: E67-E73.

G.J. Crowther et al. The control of glycolysis in contracting skeletal muscle. II. Turning it off. *American Journal of Physiology* **282**: E74-E79.

G.J. Crowther et al. A "functional biopsy" of muscle properties in sprinters and distance runners. *Medicine and Science in Sports and Exercise* **34**: 1719-1724.

2001 K.E. Conley et al. Limits to sustainable muscle performance: interaction between glycolysis and oxidative phosphorylation. *Journal of Experimental Biology* **204**: 3189-3194. [special issue]

1997 G.J. Crowther and D.V. Lynch. Characterization of sphinganine kinase activity in corn shoot microsomes. *Archives of Biochemistry and Biophysics* **337**: 284-290.

Other papers and creative work

- *Annals of Improbable Research*, 2000-2002
- *Biochemistry and Molecular Biology Education*, 2005
- *Bricolage*, 2015
- *CAUSEweb.org Fun Collection*, 2017-2019, 2022
- *Crosscurrents*, 2018
- *Dynamic Ecology* [blog], 2016-2017, 2019-2021
- *Genetic Engineering & Biotechnology News*, 2012, 2014
- *HAPS Blog*, 2018
- *Journal of Experimental Biology*, 2004-2005
- *LifeSciTRC.org PECOP Blog*, 2018-2020
- *Northwest Runner*, 1998-2002, 2005
- *Nth Degree*, 2002
- *Runner's World*, 2003, 2007, 2010
- *Running Times*, 2012
- *Science Creative Quarterly*, 2006
- *Scientist Sees Squirrel* [blog], 2018, 2020

Conference presentations and invited talks

- STEM education/outreach
  - American Association for the Advancement of Science (AAAS), 2004
  - American Society for Biochemistry and Molecular Biology (ASBMB), 2023 [planned]
  - Anatomy & Physiology Teaching & Learning Community (A&P TLC), 2023 [planned]
  - APS Institute for Teaching and Learning (ITL), 2022
  - Association of American Colleges & Universities (AACU), 2020
  - Bastyr University, 2016
  - ChalkWaves workshop at the Kauffman Foundation (keynote speaker), 2006

  - CLIME Together (UW School of Medicine), 2016, 2021
  - Edmonds Community College, 2018
  - Everett Community College, 2017
  - Evergreen State College, 2015
  - Frontiers in Education (FIE), 2005
  - Gold Coast Science Network (keynote speaker), 2004
  - The Grading Conference, 2022
  - Green River College, 2023
  - Human Anatomy & Physiology Society (HAPS), 2015, 2021
  - Lincoln County (Oregon) K-12 Ocean Literacy Symposium, 2011
  - Mary Lidstrom (UW) 70th Birthday Symposium on One-Carbon Metabolism, 2022
  - National Institute on Scientific Teaching, 2020
  - Northwest Biology Instructors' Organization (NWBIO), 2004, 2013
  - Northwest PULSE, 2021
  - NWABR Student Bio Expo (keynote speaker), 2013
  - Rutland High School (commencement speaker), 2003
  - SABER West, 2023
  - San Diego State University, 2023
  - Southern Utah University, 2022
  - University of Alabama at Birmingham, 2023
  - VOICES, 2017-2019, 2021-2022
  - Western Washington University, 2021

- Laboratory research
  - American College of Sports Medicine (ACSM), 1999
  - American Society for Tropical Medicine and Hygiene (ASTMH), 2008-2009
  - Experimental Biology, 1999-2000
  - International Society for Magnetic Resonance in Medicine (ISMRM), 2001-2002
  - MipTec, 2010
  - Queensland-Washington Alliance, 2009
  - Richard Stockton College of New Jersey, 2007
  - Rosellini Lecture/Symposium at Providence Health & Services, 2000
  - Seattle Parasitology Conference, 2010, 2012-2013
  - University of Montana Western, 2007
  - University of Puget Sound (WA), 2002
  - Western Washington University, 2006
  - Williams College (MA), 2001
  - Wichita State University (KS), 2016

Grants, honors, and distinctions

2021-2022 Teaching Career Enhancement Award (TCEA; $5400) from the American Physiological Society

2021-2022 Fellow of the ROSE (Research On STEM Education) Network

2020 Granted tenure by Everett Community College

2019-2023 Partner Co-Investigator of "Values-based Academic Leadership Trajectories for women in STEM (VAuLTS)" grant from the National Science Foundation (#1936019; PI Maria A. Garstein, WSU)

2019 First Place (for "Trials and Errors"), A-Mu-Sing Competition, United States Conference on Teaching Statistics (USCOTS)

2018-2022 Participant in the PALM (Promoting Active Learning and Mentoring) Network (NSF grant #1624200; PI Susan M. Wick, U. of Minnesota): PALM Fellow (2018-2019),

PALM Mentor (2021-2022), and recipient (2021-2022) of PALM-FRONDS grants (3, totaling $5500) to support undergraduate research assistants

2018-2019 PECOP (Physiology Education Community of Practice) Fellow of the American Physiological Society

2015-2017 Subcontractor of "SMILES (Student-Made Interactive Learning with Educational Songs) for Introductory Statistics" grant from the National Science Foundation (#1544237; PI Lawrence M. Lesser, UTEP)

2012-2013 Principal Investigator of $50,000 Challenge Grant ("Extending primaquine use via small-molecule stabilization of G6PD mutants") from the Medicines for Malaria Venture (MMV 12-0081)

2012-2013 Co-writer of $34,533 Royalty Research Fund grant ("A screen to develop antibiotics that act by a novel mechanism") from the University of Washington (A74015)

2010-2012 Co-Investigator of RCN-UBE grant ("Trial network to bring music to the study of biology") from the National Science Foundation (#0956196; PI Wendy K. Silk, UC-Davis)

2004-2007 Individual Kirschstein NRSA fellowship ("Modular design of central metabolism in methylotrophs") from the National Institutes of Health (5F32GM070297)

1996-1999 Graduate Research Fellowship from the National Science Foundation

1995 Graduated *summa cum laude* with highest departmental honors and William C. Grant, Jr. Prize in Biology, Williams College

Research students/trainees* supervised

- Brittany Allen, 2022
- John E. Alley, 2014
- Yoko L. Chaumont, 2014
- Diana J. Chung (post-baccalaureate), 2008-2009
- Christopher J. Damman (resident in internal medicine), 2008
- Kartheek S. Dasari, 2011-2012
- Dilan P. Evans, 2020-2021
- Sasha D. Gradwell, 2022
- Jackson C. Jones, 2011-2013
- Kuzma V. Kovzun, 2008-2010
- Mallory M. Krahn, 2011-2013
- Jason E. W.-L. Lum, 2005-2006
- Allison J. Ma, 2016
- Jacob W. McPhee, 2010-2011
- Jack S. Mo, 2011-2014
- Avrey A. Novak, 2014
- Thuong T. H. Phan, 2014-2016
- S. Arshiya Quadri (medical student), 2011
- Benjamin J. Shannon-Alferes, 2010-2011
- Andrew P. Thomas, 2008-2010
- Victoria L. VanHeel, 2022
- Mengfan Wang (M.S.I.M. student), 2012-2013
- Sarah J. Ward (Ph.D. student, College of Education), 2013-2016

- Tatiana (Phillips) Weaver, 2012-2014
- Sara M. Weller (medical student), 2012
- Jason Wessels (M.Ed. student), 2015-2016
- Daniel W. Yates, 2005-2006

*undergraduates, unless otherwise noted

Intramural service and activities

2022 Course Evaluation Committee, Everett Community College

2017-2018 New Faculty Academy, Everett Community College

2015-2016 Fellow, Facilitated Faculty Learning Community on Reflective Teaching, University of Washington Bothell

2015-2016 Curriculum committee, Division of Biological Sciences, University of Washington Bothell

2011-pres. Biology Learning and Teaching (BLT) group / Biology Education Research Group (BERG), University of Washington

2003-2005 Scholarship of Teaching & Learning (SoTL) committee, University of Washington

STEM outreach

2013 Summer instructor, Upward Bound program, University of Washington (Seattle)

2011- Science/STEM events and consultations for students and families
- Brain Awareness Week (UW), 2013
- Life Sciences Research Weekend (NWABR/Pacific Science Center), 2013
- Glacier Peak High School: Night of the Arts & Science, 2017
- Inspire STEM (UW-Bothell), 2015
- Paws-On Science (Pacific Science Center/UW), 2011-2013
- Seattle Academy (SAAS): expert review of final projects, 2017
- Seattle Girls' School: email expert, 2014, 2016-2019, 2021-2022
- Seattle Science Festival, 2013
- Student Bio Expo (NWABR), 2011-2018
- Totem Middle School STEM Night, 2014
- Yakima Science & Engineering Festival (GEAR UP), 2012-2013

2011-2014 Community outreach and special events for UW School of Medicine
- Biotechnology Advisory Board, Department of Genome Sciences, 2012-2014
- Hosted visiting high school students, 2011-2014
- Featured speaker at Mini Medical School, 2012

2004-2006 Guest lecturer, Genetics Outreach for Minorities (GenOM) Project, University of Washington (Seattle)

2004-2005 Summer instructor, GEAR UP program, University of Washington (Seattle)

Peer reviews

- Grant proposals
  - Civilian Research & Development Foundation, 2004
  - Institute of Translational Health Sciences (ITHS), 2010

  - Medical Research Council (UK), 2014
  - NIH Recovery Act Limited Competition (RC4 mail review), 2010
  - National Science Foundation, 2019
  - UEFISCDI (Romania), 2012
  - University of Washington Royalty Research Fund, 2013
  - UW-Bothell SRCP, 2021
- STEM education/outreach manuscripts
  - *Academia Letters*, 2021
  - *Advances in Physiology Education*, 2022-2023
  - *Biology* (7th edition) by Campbell & Reece, 2003
  - *Biological Basis of Disease* [book proposal], 2015
  - *CourseSource*, 2019
  - *HAPS Educator*, 2018-2022; **editorial board, 2019-**
  - *Hole's Human Anatomy & Physiology* (15th edition) by Shier et al., 2019
  - *Human Anatomy & Physiology* by Amerman, 2016
  - *International Journal of Science Education*, 2017-2021; **editorial board, 2022-**
  - *International Journal of Teaching and Learning*, 2022
  - *Journal of Chemical Education*, 2019, 2022-2023
  - *Journal of Mathematics and the Arts*, 2014
  - *Journal of Mathematics Education*, 2015
  - *Journal of Natural History Education and Experience*, 2014
  - *LIFE: The Science of Biology* (7th edition) by Purves et al., 2003
  - *PLoS ONE*, 2021
  - *Research in Science & Technological Education*, 2017
  - *Science Education*, 2017-2020
- Laboratory research manuscripts
  - *Acta Crystallographica Section F*, 2012
  - *Applied Biochemistry and Biotechnology*, 2016
  - *BBA Molecular Cell Research*, 2013
  - *Biochemistry*, 2012
  - *BMC Complementary and Alternative Medicine*, 2016
  - *Current Drug Targets*, 2010
  - *Drug Discovery Today*, 2014
  - *Electronic Journal of Biotechnology*, 2016
  - *Enzyme and Microbial Technology*, 2014
  - *F1000 Research*, 2017
  - *Journal of Biomolecular Screening*, 2011-2013
  - *Journal of Helminthology*, 2012
  - *Letters in Drug Design & Discovery*, 2013
  - *Malaria Journal*, 2016
  - *Medicinal Research Reviews*, 2013
  - *Medicine and Science in Sports and Exercise*, 2003-2004
  - *Molecular & Biochemical Parasitology*, 2007
  - *Parasitology Research*, 2010
  - *PLoS Neglected Tropical Diseases*, 2010, 2013
  - *PLoS ONE*, 2014