CURRICULUM VITAE

Gregory J. Crowther, Ph.D.
Email: gcrowther@everettcc.edu / Phone: 425-388-9480
Website: https://faculty.washington.edu/crowther/

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 and B.L. Wiggins. Redistributing academic power by reforming unjust exam practices. In review.

2023 G.J. Crowther et al. Chatbot responses suggest that hypothetical biology questions are harder than realistic ones. *Journal of Microbiology and Biology Education* **24**(3)*:* e00153-23.

G.J. Crowther et al. Teaching science with the "universal language" of music: alignment with the Universal Design for Learning framework. *Advances in Physiology Education* **47**(3): 491-498.

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**(1): e00200-22.

G.J. Crowther et al. A simple method for predicting a molecule's biological properties from its polarity. *CourseSource* **10**: 16.

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, 2023
- *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, 2023

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
  - Anatomy & Physiology Teaching & Learning Community (A&P TLC), 2023
  - American Physiological Society, 2022 (ITL), 2024 [scheduled]
  - Association of American Colleges & Universities (AACU), 2020
  - Bastyr University, 2016
  - 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 [Eastern Regional meeting], 2021
  - Kauffman Foundation (keynote speaker), 2006
  - 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, 2018, 2023
  - Northwest PULSE, 2021
  - NWABR Student Bio Expo (keynote speaker), 2013
  - Rutland High School (commencement speaker), 2003
  - SABER West, 2023-2024
  - San Diego State University, 2023
  - Southern Utah University, 2022
  - University of Alabama at Birmingham, 2023
  - VOICES, 2017-2019, 2021-2022
  - Washington State Board for Community and Technical Colleges, 2023
  - Western Washington University, 2021
  - Williams College, 2023

- 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

2023 Named a "Star Reviewer" by the American Physiological Society (first-ever honoree from a two-year college)

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
2019-2024	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

2023-	Assessment Committee, Everett Community College
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
  - *Cogent Education*, 2023
  - *CourseSource*, 2019, 2023
  - *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, 2022-2024
  - *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, 2023
- 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