

Charles Nuttelman
Charles.Nuttelman@Colorado.EDU

PROFESSIONAL

Summer 2022 – Current: Teaching Professor, Department of Chemical and Biological Engineering, University of Colorado at Boulder.

Summer 2018 – Summer 2022: Senior Instructor, Department of Chemical and Biological Engineering, University of Colorado at Boulder.

Fall 2007 – Summer 2018: Instructor, Department of Chemical and Biological Engineering, University of Colorado at Boulder.

Spring 2016 – Spring 2018: Faculty advisor for the College of Engineering and Applied Science's Biomedical Engineering Minor program.

Spring, 2007: Lecturer, Department of Chemical and Biological Engineering, University of Colorado at Boulder.

October 2005 – Spring 2007: Senior Research Associate, Department of Chemical and Biological Engineering, University of Colorado at Boulder.

HONORS AND AWARDS

Boulder Faculty Assembly Excellence in Teaching and Pedagogy Award (2023)

2023 Outstanding Undergraduate Teaching Faculty Award, Department of Chemical and Biological Engineering, University of Colorado at Boulder

2021 Outstanding Undergraduate Teaching Faculty Award, Department of Chemical and Biological Engineering, University of Colorado at Boulder

2019 Outstanding Undergraduate Teaching Faculty Award, Department of Chemical and Biological Engineering, University of Colorado at Boulder

2018 Summer Session Online Course Development Grant to develop and teach COEN 1100 Computing Tools for Creative Problem Solving (Arts & Sciences course) in an online format.

2014 Summer Session Online Course Development Grant to develop and teach COEN 1300 Introduction to Engineering Computing in an online format.

2011 Faculty Mentor Award, Department of Chemical and Biological Engineering, University of Colorado at Boulder

LIST OF COURSES TAUGHT

(Alphabetical; numbers in parentheses indicate number of times taught; includes fall 2023)

Summary: 18 different courses taught; 76 total courses taught (two sections in the same term counted twice); will break 23,200 total student credit hrs as of fall 2023.

BMEN 2000 Introduction to Biomedical Engineering (3); CHEN 1000 Creative Technology (3); CHEN 1211 Chemistry for Engineers (1); CHEN 1300 Introduction to Chemical Engineering (3); CHEN 1310/GEEN 1300/COEN 1300 Computing for Engineers (21); CHEN 2120 Material and Energy Balances (5); CHEN 2810 Biology for Engineers (8); CHEN 3010 Applied Data Analysis (9); CHEN 3130 Junior Lab (5); CHEN 3220 Separations and Mass Transfer (1); CHEN 4130 Senior Lab (2); CHEN 4520 Senior Design (3); CHEN 4530 Design Project (1); CHEN 4570 Process Control (5); CHEN 4805 Biomaterials (1); CHEN 4802 Tissue Engineering (1); CHEN 4810 Biological Engineering Lab (3); GEEN 1400 Engineering Projects (1).

"Excel/VBA for Creative Problem Solving, Part 1", online MOOC offered by Coursera (<https://www.coursera.org/learn/excel-vba-for-creative-problem-solving-part-1>)

"Excel/VBA for Creative Problem Solving, Part 2", online MOOC offered by Coursera (<https://www.coursera.org/learn/excel-vba-for-creative-problem-solving-part-2>)

"Excel/VBA for Creative Problem Solving, Part 3 (Projects)", online MOOC offered by Coursera (<https://www.coursera.org/learn/excel-vba-for-creative-problem-solving-part-3-projects>)

"Everyday Excel, Part 1", online MOOC offered by Coursera (<https://www.coursera.org/learn/everyday-excel-part-1>)

"Everyday Excel, Part 2", online MOOC offered by Coursera (<https://www.coursera.org/learn/everyday-excel-part-2>)

"Everyday Excel, Part 3 (Projects)", online MOOC offered by Coursera (<https://www.coursera.org/learn/everyday-excel-projects>)

EDUCATION-RELATED CONFERENCES ATTENDED

Spring 2018 Coursera Partners Conference, Tempe, AZ, March 2018.

ABET 2014 Symposium, Pittsburgh, PA, April 2014.

2011 Annual Conference of the American Society of Engineering Education (ASEE), Vancouver, BC, June 2011.

Accreditation Board for Engineering and Technology (ABET) 2010 Symposium, Las Vegas, NV, April 2010.

Workshop on Microbial Fermentation: Development & Scale-Up, Utah State University Center for Integrated BioSystems, May 2009.

EDUCATION

University of Colorado, Boulder, CO. Doctor of Philosophy in Chemical and Biological Engineering. Defense completed in April, 2005. GPA: 3.68/4.00.

University of Colorado, Boulder, CO. Master of Science in Chemical Engineering. December 2001. GPA: 3.68/4.00.

University of Colorado, Boulder, CO. Bachelor of Science in Chemical Engineering with High Distinction. May 1999. GPA: 3.92/4.00.

GRADUATE RESEARCH EXPERIENCE

Doctoral Thesis. Dr. Kristi Anseth, major professor. September 2002 to May, 2005. Osteogenic Poly(Ethylene Glycol)-Based Hydrogels for Human Mesenchymal Stem Cell Culture and Bone Regeneration. An experimental investigation into the photoencapsulation of human mesenchymal stem cells and their subsequent differentiation into osteoblasts. Cell viability was assessed and improved by incorporating adhesion peptide sequences and charge and osteogenic differentiation was measured using enzymatic quantification assays and gene expression of osteoblast-specific genes. Finally, the osteogenic molecule dexamethasone was covalently linked to a hydrogel network through degradable ester linkages, resulting in release of dexamethasone to encapsulated cells with degradation of those ester bonds, leading to osteogenic differentiation.

Master's Thesis. Dr. Kristi Anseth, major professor. August 1999 to August 2001. Using a polymeric scaffold based on poly(vinyl alcohol), we investigated engineering functional heart valve tissue in vitro that could eventually be implanted into a patient to restore function to a diseased or damaged heart valve.

GRADUATE HONORS AND AWARDS

2005 American Institute of Chemists Graduate Award, Department of Chemical and Biological Engineering, University of Colorado at Boulder

2000 National Science Foundation Graduate Research Fellowship Recipient (3-year fellowship)

2000 and 2004 GAANN (Graduate Assistantships in Areas of National Need) Fellowship Recipient from Graduate Program in Macromolecular Chemistry and Engineering, U.S. Department of Education.

Beverly Sears Graduate Student Grant Recipient, Fall 2003

Outstanding Graduate Teaching Assistant, 2000

PUBLICATIONS (underlined co-author denotes undergraduate student)

C.R. Nuttelman, M.A. Rice, A.E. Rydholm, D.N. Shah, and K.S. Anseth. "Macromolecular Monomers for the Synthesis of Hydrogel Niches and Their Application in Cell Encapsulation and Tissue Engineering." *Progress in Polymer Science*, submitted.

C.R. Nuttelman, A.M. Kloxin, and K.S. Anseth. "Temporal changes in PEG hydrogel structure influence human mesenchymal stem cell proliferation and matrix mineralization," *Tissue Engineering Advances in Experimental Medicine and Biology*, 585: 135-149 (2006).

C.R. Nuttelman, D.S.W. Benoit, M.C. Tripodi, and K.S. Anseth. "The effect of ethylene glycol methacrylate phosphate in PEG hydrogels on mineralization and viability of encapsulated hMSCs." *Biomaterials*, 27, 1377-1386 (2006).

C.R. Nuttelman, M.C. Tripodi, and K.S. Anseth. "Dexamethasone-functionalized gels induce osteogenic differentiation of encapsulated hMSCs." *Journal of Biomedical Materials Research*, 76A (1): 183-195 (2006).

C.R. Nuttelman, M.C. Tripodi, and K.S. Anseth. "Synthetic Hydrogel Niches That Promote hMSC Viability." *Matrix Biology*. 24(3): 208-218 May 2005.

C.R. Nuttelman, M.C. Tripodi, and K.S. Anseth. "In Vitro Osteogenic Differentiation of Human Mesenchymal Stem Cells Photoencapsulated in PEG Hydrogels." *Journal of Biomedical Materials Research*. 68A (4): 773-782 MAR 15 2004.

C.R. Nuttelman, S.M. Henry, and K.S. Anseth. "Synthesis and characterization of photocrosslinkable, degradable poly(vinyl alcohol)-based tissue engineering scaffolds." *Biomaterials*, 23, 3617-3626 (2002).

C.R. Nuttelman, D.J. Mortisen, S.M. Henry, and K.S. Anseth. "Attachment of fibronectin to poly(vinyl alcohol) hydrogels promotes NIH3T3 cell adhesion, proliferation, and migration." *Journal of Biomedical Materials Research*, 57, 217-223 (2001).

Bryant, Stephanie J., Nuttelman, Charles R., and Anseth, Kristi S., "An Evaluation of the Cytocompatibility of Several Photoinitiating Systems", *Journal of Biomedical Materials Research – Polymer Edition* 11: (5) 439-457 2000.

S.J. Bryant, C.R.Nuttelman, and K.S.Anseth, "The Effects of Crosslinking Density on Cartilage Formation in Photocrosslinkable Hydrogels," in *Biomedical Sciences Instrumentation*, P.E.Patterson (ed.), 35, 309-14 (1999).

PRESENTATIONS AND PROCEEDINGS

C.R. Nuttelman. "A Senior-Level Biological Engineering Lab Course at the University of Colorado: Experiences and Lessons Learned," presented at the 2011 Annual Meeting of ASEE, Vancouver, BC.

C.R. Nuttelman, M.A. Rice, D.N. Shah, B.D. Fairbanks, and K.S. Anseth. "Photoinitiated Polymerizations for the Synthesis of Hydrogel Niches for Cell Encapsulation and Tissue Engineering," Invited talk, 2007 Materials Research Society Spring Meeting, San Francisco, April 12th.

C.R. Nuttelman and K.S. Anseth, "Osteogenic Hydrogels for Controlled Differentiation of Human Mesenchymal Stem Cells." *Australasian Society for Biomaterials 16th Annual Conference*, Rotorua, New Zealand, February 9th, 2006.

C.R. Nuttelman, M.C. Tripodi, and K.S. Anseth. "Controlling Viability of Human Mesenchymal Stem Cells Photoencapsulated in Poly(Ethylene Glycol)-Based Hydrogels." *Annual Fall Meeting of the Materials Research Society*, Boston, MA, December 1st, 2004.

C.R. Nuttelman, M.C. Tripodi, K.S. Anseth, "Osteogenic Differentiation of Human Mesenchymal Stem Cells Photoencapsulated in PEG Hydrogels," *7th World Biomaterials Congress*, Sydney, Australia, May 2004.

C.R. Nuttelman, G.A. Walker, J.E. Sheren, L.A. Leinwand and K.S. Anseth, "Tissue Engineering of the Aortic Heart Valve: A Cell Biology Approach," *Society for Biomaterials Transactions*, **24**, 417 (2001).

C.R. Nuttelman, G.A. Walker, J.E. Sheren, L.A. Leinwand and K.S. Anseth, "Tissue Engineering of the Aortic Heart Valve", *Society for Heart Valve Disease Biannual Meeting*, London, England, June 2001.

C.R. Nuttelman, G.A. Walker, L.A. Leinwand, and K.S. Anseth. "Characterization of valve cells and their interactions with a poly(vinyl alcohol) scaffold", *2001 American Chemical Society National Meeting*, San Diego, CA, April 2001.

C.R. Nuttelman. "Tissue Engineering of the Heart Valve," a presentation to the multidisciplinary Biophysics Supergroup of the University of Colorado, January 22, 2001.

C.R. Nuttelman, S.M. Henry, K.S. Anseth, "Surface Modification of Poly(Vinyl Alcohol Hydrogels Promotes Cell Adhesion," Biomedical Engineering Society National Meeting, Seattle, WA, October 2000.

C.R. Nuttelman and K.S. Anseth, "Attachment of Proteins to Poly(vinyl alcohol) for biomedical applications" Polymer Preprints, 41, 1685-6 (2000).

C.R. Nuttelman and K.S. Anseth, "Tissue Engineering of Cartilage in Poly(Vinyl Alcohol) Hydrogels," AIChE National Meeting, Miami, FL, November 1998.

PATENTS

United States Patent Application #20030144373: Bowman, Christopher; Anseth, Kristi; Hacıoglu, Bilge; Nuttelman, Charles. Summary: A thiol-ene polymeric material is disclosed. The material is produced by the photopolymerization of reactants having thiol and olefin moieties. The material can incorporate encapsulated components, including cells. Additionally, the material can be derivatized by reacting the polymeric material with components such as proteins.

Recent Patent Disclosures: CU1319B, "Photoreactive Drug Conjugates for Controlled Delivery"; and CU1497, "Osteogenic Hydrogels for Controlled Differentiation of hMSCs."

References:

Teaching

- Dr. Janet DeGrazia, Senior Instructor, Department of Chemical and Biological Engineering: (303) 735-4763, degrazia@spot.colorado.edu.
- Dr. David Clough, Professor, Department of Chemical and Biological Engineering: (303) 492-6638, David.Clough@Colorado.EDU.

Online Education

- Christopher Haynes, PhD, Director of Learning Experience Design, Provost's Office for Academic Innovation, University of Colorado Boulder, christopher.haynes@colorado.edu
- Cory Pavicich, Digital Learning Initiatives. University of Colorado at Boulder, 303-735-CORY (2679), cpav@colorado.edu.

Research

- Dr. Kristi Anseth (Master's and Ph.D. Research Advisor), Professor, Department of Chemical and Biological Engineering; Associate Professor of Surgery, University of Colorado Health Sciences Center; Howard Hughes Medical Institute Assistant Investigator: (303) 492-3147, Kristi.Anseth@Colorado.EDU.
- Dr. Leslie Leinwand, Professor and Department Chair, Department of Molecular, Cellular, and Developmental Biology: (303) 492-7606, Leslie.Leinwand@Colorado.EDU.
- Mark Randolph, M.A.S., Laboratory Director, Plastic Surgery Research Laboratory, Massachusetts General Hospital; Instructor in Surgery, Harvard Medical School: (617) 726-6943, randolph.mark@mgh.harvard.edu.