

JENIFER BLACKLOCK, PhD

EDUCATION

- 2009 Max Planck Institute | Fulbright Program ▪ Potsdam, Germany
DOCTOR OF PHILOSOPHY (PhD) IN BIOMEDICAL ENGINEERING
- 2006 Wayne State University ▪ Detroit, MI, USA
MASTER OF SCIENCE (MS) IN BIOMEDICAL ENGINEERING
- 2004 Miami University ▪ Oxford, OH, USA
BACHELOR OF SCIENCE (BS) IN ENGINEERING MANAGEMENT
- 2004 Miami University ▪ Oxford, OH, USA
BACHELOR OF SCIENCE (BS) IN MANUFACTURING ENGINEERING

PROFESSIONAL EXPERIENCE

- 2021-current **Director CU-Western Partnership Program – Rady School of Computer Science and ME**
University of Colorado ▪ Boulder, CO, USA
Western Colorado University Colorado ▪ Gunnison, CO, USA
- Chair of the Rady School Curriculum Committee - ME and CS
 - Developed recruiting tools and marketing for the Rady School
 - Created an advisory board for the Rady School
 - Ensured a smooth start of the program and the Rady School opening
- 2018-2021 **Teaching Professor – Mechanical Engineering**
Colorado School of Mines ▪ Golden, CO, USA
- Chair of the Undergraduate Curriculum Committee
 - Chair of department focused Peer Course Observations
- 2018-2020 **Associate Director – Advanced Manufacturing Program**
Colorado School of Mines Golden, CO, USA
- **Chair of curriculum and course development for Advanced Manufacturing**
 - **Director of the Smart Manufacturing Online Graduate Certificate Program**
 - Curriculum development of entire program - MSNT and two certificate programs
 - Developed a fully online MS-NT program approved by HLC - 35 students in year 1
 - Recruited students and current employees both locally and nationally
- 2017-2018 **Instructor**
University of Colorado ▪ Boulder, CO, USA
- Integrated hands-on modules into large core engineering classes
 - Research focus: Integrating sociotechnical thinking into core engineering classes
- 2014-2017 **Assistant Department Head**
Colorado School of Mines ▪ Golden, CO, USA
- **Chair of the Mechanical Engineering (ME) curriculum**
 - Led ABET assessment and program evaluation for the ME degree program
 - Assisted in scheduling ~50 courses/semester
- 2016–2017 **Teaching Professor**
Colorado School of Mines ▪ Golden, CO, USA
- **Innovation in course development, assessment and pedagogy**
 - Faculty representative and training coordinator for three innovation spaces on campus
 - Led initiatives for Innovation and Entrepreneurship at the campus level
 - Implemented on-line assessment documentation for all courses in the ME department

- 2012–2016 **Associate Teaching Professor**
 Colorado School of Mines ▪ Golden, CO, USA
- **Course coordinator for Machine Design, Manufacturing Processes, Field Session**
 - Head of the Undergraduate Curriculum Committee, working on continuous improvement of the current Mechanical Engineering curriculum
 - Led ABET program evaluation and self-study reports for 2013 ABET visit
- 2010–2012 **Materials Engineer**
 National Institute of Standards and Technology (NIST) ▪ Boulder, CO, USA
- **Granted a 2 year NRC (National Research Council) Postdoc**
 - In charge of two lab assistances, one high school student and two Masters students
- 2009–2010 **Postdoctoral Fellow**
 Max Planck Institute of Colloids and Interfaces ▪ Potsdam, Germany
- **Received the Max Planck Fellowship for International Research**
 - Focused on nanoparticle manufacturing techniques
- 2008–2009 **Fulbright Fellow**
 Max Planck Institute of Colloids and Interfaces ▪ Potsdam, Germany
- **Received a Fulbright Fellowship to conduct research at MPI over 1 year**
- 2006–2008 **Graduate Research Associate – Department of Pharmaceutical Sciences**
 Wayne State University ▪ Detroit, MI, USA
- **Received a Graduate Professional Scholarship** with the Department of Pharmaceutical Sciences
 - Applied best practices in examining gene expression *in vitro* and *in vivo*
- 2004–2006 **Graduate Research Associate – Department of Chemical Engineering**
 Wayne State University, Department of Chemical Engineering ▪ Detroit, MI, USA
- Delivered outstanding leadership in educating thermodynamics and mentoring 2 Masters students
- 2003–2005 **Project Manager**
 TESCO/HIROTEC Engineering Firm ▪ Auburn Hills, MI, USA
- Held accountability in installing assembly lines into GM and Ford plants
 - Assumed full responsibility for getting bids on projects for implementing autonomous systems efficiently and effectively into established assembly lines
 - Collaborated with plant workers, as well as with Finance, Sales, Management, R&D, and purchasing departments to complete multimillion dollar projects

TEACHING

Principle Teaching Interests: My teaching interests include, but are not limited to manufacturing, machine design, solid mechanics, project-based courses and hands-on curriculum. I believe strongly in project-based learning and hands-on curriculum for teaching and learning, even with large sizes. I have brought in over \$200,000 of equipment to Mines, which is mostly used for the hands-on courses along with development of several innovation spaces on campus. I have developed two core courses in both the ME undergraduate curriculum and several others in the Advanced Manufacturing Program. Over the years I have revamped many courses which can be seen in the list below. I have worked hard to bring innovation into the classroom through assessment and creative teaching techniques and I feel strongly about working with local industry to support student learning.

Course Development

MEGN200: Introduction to Programming and Hardware Interface | Coordinator (2015-2017, 2018-2019)
 A project-based course teaching students about programming in MatLAB. Students create prototypes to solve open-ended design challenges using software and hardware

componentry. Students also learn how to implement engineering design practices into solving open-ended design challenges.

MEGN201: Introduction to Design and Fabrication | Coordinator (2012-2017)

Field Session is a unique three-week practical course, aimed at providing students with a strong hands-on experiences for 40+ hrs/week. 350+ ME undergraduate students take this course every summer experiencing machining, GD&T, quality control, data acquisition and design through several projects implemented throughout the three-week period.

MEGN381: Manufacturing Processes | Coordinator (2014-2017, 2018-current)

Manufacturing Processes has a focus in design for manufacturability where students are required to complete four hands-on projects throughout the semester (~150-180 students/semester). This is a practical course where students gain experience in ethics in manufacturing practice and also about various manufacturing processes used in industry.

MEGN 481: Machine Design | Coordinator (2012-2014)

Machine Design is a traditional course taught in ME, however a Design Studio was added to the course providing students with a unique engineering design experience.

EBCN 360: Introduction to Entrepreneurship | Coordinator (2016)

The course is based on Alexander Osterwalder's Business Canvas Model along with Steve Blanks Lean LaunchPad methodologies. The course is project-based where students are required to hypothetically start a company using the entrepreneurial skillsets as a management science. Students learn the importance of pivoting an idea and also the design process, strongly relating to engineering design.

MEGN 498: Industrial Automation and Design | Faculty Advisor and Co-Coordinator (2016)

The course teaches students about PLC's (programmable logic controllers) and how they are used in manufacturing lines. This is a hands-on course where students gain experience with programming a Montrac system throughout the semester.

MEGN 498: Geometric Dimensioning and Tolerancing (GD&T)

Students learn the fundamentals of GD&T and then, using a scaffolding approach, apply learned concepts to real components using a metrology lab. This is a hands-on course using equipment in the machine shop along with metrology equipment. By the end of the class, students have the basic understanding of basic to more complex GD&T concepts, including positional tolerances.

AMFG 422/522: Lean Manufacturing | Coordinator (2019-current)

Throughout the course, students learn to apply skillsets to real world problems, focusing on lean and six-sigma principles and methodologies. The course is taught with a focus on the DMAIC structure of implementation (Define, Measure, Analyze, Improve and Control) for improving and implementing process efficiencies in industry. By the end of the course, students will be prepared to take their six-sigma green belt certification.

AMFG 498/598: Design for Excellence | Coordinator (2020-current)

Design for Excellence (DFX) is a manufacturing focused course, teaching students about designing for manufacturability, assembly, cost and society. This is a project-based course, that focuses on various design methodologies for manufacturing. Students will develop skillsets that can easily be transferred to an industrial setting.

Teaching Experience: I have taught 40+ courses and studios at Colorado School of Mines and CU-Boulder.

Colorado School of Mines (avg credit hrs delivered/AY = 1,300 - 4.5/5.0 avg teaching evals)

MEGN 200: Introduction to Programming and Hardware Interfaces

MEGN 201: Introduction to Design and Fabrication

MEGN 212: Mechanics of Materials

MEGN 315: Dynamics

MEGN 381: Manufacturing Processes

MEGN 481: Machine Design + Machine Design Studio

MEGN 498: Industrial Automation and Design

MEGN 498: GD&T (Independent students every semester 2012-2014)
MEGN 498: Intermediate Machining Course
EGGN 491/2: Senior Design (Technical Consultant for 2-3 teams annually)
CSM 101: Freshman Course
EBGN 360: Introduction to Entrepreneurship
AMFG 422/522: Lean Manufacturing
AMFG 498/598: Design for Excellence
AMFG 498/598: Layer-by-layer deposition for bio-3D printers

CU-Boulder

MCEN 4026: Manufacturing Processes & Systems
MCEN 4026: Manufacturing Hands-on Lab
GEEN 1400: Freshman Projects

LEADERSHIP

Leadership Roles: Since starting at Mines, I have held several key leadership roles on campus and at a national level. I have been the Chair of the Undergraduate Curriculum Committee (UGCC) as well as the Associate Director of the Advanced Manufacturing Program, leading curriculum develop and assessment efforts for both. I was part of the first online program at Mines that was approved in May 2020 by the Higher Learning Commission (HLC) as well. I have been in charge of the ME undergraduate curriculum, ME course assessment, program evaluation for ABET and Teaching Across the Curriculum implementation on-and-off at Mines for eight years. Over the past five years, I have been a key contributor and creator of the Innovation Hub, a network of technical content and innovations spaces to support innovation initiatives on campus. Furthermore, since starting the Advanced Manufacturing program at Mines, I have been focused on developing curriculum that supports financial models on campus. For instance, I created an online certificate programs that can be completed during the summer for both undergraduate and graduates. Additionally, I set-up a MOU with Metro State for a 4+1 program and also worked with the University of Dublin to create a similar program. These initiatives support a financial model to continue growing the program.

Department and Campus Leadership

2019-current Smart Manufacturing Program | Director
2019-current MOU 4+1 Programs with Metro State and University of Dublin | Director
2019-current Manufacturing Design Innovation Competition | Chair
2019-current Nicoloff Fellow for Campus Innovation | Fellow
2019-current ME Wellness Committee | Member
2019 Engineering and Facilitating Online Learning (EFOL) | Course participant
2018-current ME ShopOps Committee - Developing hands-on spaces for students | Member
2018-current Mechanical Engineering Promotional Committee | Member
2018-current Advanced Manufacturing Program | Associate Director
2018-current Department Peer Observation Committee | Chair
2017-2018 Undergraduate Curriculum Committee (UGC) | Member (CU-Boulder)
2017-2018 Teaching Quality Framework (TQF) Committee (campus) | Member (CU-Boulder)
2017-2018 Student Experiential Education (SEE) Initiative | Chair (CU-Boulder)
2017-2018 Strategic Action Committee (SAC), Department and College (CU-Boulder) | Member
2016-current Innovation and Entrepreneurship Campus Committee | Member
2016-current Academic Management Institute (AMI) | Fellow
2016 Presentation to the Mines Board of Trustees on *The Current Landscape of Innovation at Mines*
2016-current Teaching Across the Curriculum | Chair
2015-2017 Pathways to Innovation | Fellow

2015-current The Hub Center for Innovation | Faculty Advisor
2015-2017 Mines Maker Society | Faculty Advisor
2014-2017 ME Assistant Department Head
2014-2017 Machine Shop | Faculty Advisor
2013-current ME Undergraduate Curriculum Committee (UGCC) | Chair

External Leadership

2019 NSF-DMTL - Digitally Mediated Team Learning | Fellow
2017 NAE-CEES workshop | Fellow
2016-current ASEE | Reviewer and panel moderator
2015-current CEC Women's Advisory Board Miami University | Member

RESEARCH EXPERIENCE

Principle Research Interests: My principle research interests include innovation in engineering education, teaching project-based learning to large classes, investigating core skillsets taught and learned across the curriculum and tracking students' abilities to solve open-ended design problems. I started a new Advanced Manufacturing Program at Mines in 2018 which has a minor and area of special interest, along with a fully online MS-NT (non-thesis) and two Graduate Certificate Programs. Together with the Center for Teaching and Learning at Mines, we received a \$2M grant that focuses on advanced manufacturing curriculum to support the current workforce. I work closely with many industries nation-wide to bring state-of-the-art curriculum to students.

Grants and Proposals

2019-current NSF-PEER | Co-PI | Funded ▪ \$2,000,000 over three years
Engineering Online Learning Pathways in Advanced Manufacturing and Data Science

2019-2020 NSF-SBIR | Engineer | Microbial Pulse Diagnostics, LLC ▪ \$225,000 over one year

2017-2021 NSF-RFE | Co-PI | Funded ▪ \$363,000 over three years
Understanding the Formation of Sociotechnical Thinking in Engineering Education

2019 NSF-DMTL | Fellow and workshop participant
Digitally Mediated Team Learning

2017 EEF Proposal | PI | Funded ▪ \$6,000
Quality Control Equipment for teaching GD&T in Manufacturing Lab

2017 EEF Proposal | PI | Funded ▪ \$6,000
Casting Equipment for Hands-on Manufacturing Lab

2017 NAE-CEES | Co-PI | Funded
Development of modules for teaching social justice across diverse engineering disciplines

2016 Venture Well Pathways to Innovation Grant | Co-PI | Funded ▪ \$50,000 over one year
Sparking Innovation, Commercialization, and Entrepreneurship (SPICE) Among Engineering Students at the Colorado School of Mines VentureWell Course & Program Faculty Grant Proposal

2013-current Mines Tech Fee Grants | PI | Funded ▪ over \$300,000 worth of equipment funded for innovation spaces on campus and innovation in teaching

Publications

1. **Blacklock J.**, *Implementing lean thinking for curriculum development of a new advanced manufacturing program*, ASEE (2020).

2. **Blacklock J.**, Johnson K., *Faculty interpretations of engineering students' sociotechnical thinking*, ASEE (2020).
3. Zou Y., Wan L., **Blacklock J.**, Xie L., Carroll S., Oupicky D., Mao G., *In situ AFM analysis investigating disassembly of DNA nanoparticles and nano-films*, Nanotechnology for Nucleic Acid Delivery, 199-209 (2019).
4. Zou Y., Wan L., **Blacklock J.**, Oupicky D., Mao G., *In situ AFM analysis investigating disassembly of DNA nanoparticles and nanofilms*, Nanotechnology for Nucleic Acid Delivery, 199-209 (2019).
5. Claussen S., **Blacklock J.**, Tsai J., Johnson K., *Pain and gain: barriers and opportunities for integrating sociotechnical thinking into diverse engineering courses*, ASEE (2019).
6. Lydens J., Moskal B., Claussen S., **Blacklock J.**, Johnson K., *Measuring changes overtime in sociotechnical thinking: A survey validation model for sociotechnical habits of mind*, ASEE (2018).
7. **Blacklock J.**, Claussen S., Dave V., Marr J., *Development of modules for teaching social justice across diverse engineering disciplines*, NAE-CEES workshop, Washington DC (January 2017).
8. **Blacklock J.**, Claussen S., *WORK IN PROGRESS: Design, Creation and Assessment of Innovation Spaces Across an Engineering Campus*, ASEE (2016)
9. **Blacklock J.**, Mondry M., *Disseminating Innovation and Entrepreneurship Initiatives throughout a STEM Focused Campus - An Agile Experience*, ASEE (2016).
10. **Blacklock J.**, Dean J., *Teaching and learning open-ended problem solving throughout a new degree program*, ASEE (2015).
11. **Blacklock J.**, *Hands-on manufacturing concepts taught to sophomore level students during a unique Field Session experience*, ASEE (2015).
12. Rodriguez D., **Blacklock J.**, *Letting students learn through making mistakes: Teaching hardware and software early in an academic career*, ASEE (2015).
13. **Blacklock J.**, Rodriguez D., Bach J., Burmeister J., *Using hardware throughout a Mechanical Engineering curriculum to present open-ended design challenges to sophomore students*, ASEE Rocky Mountain Chapter, (2015).
14. **Blacklock, J.**, *Building confidence and creativity for the next generation of thinkers*, Boulder County Kids Health, (2014).
15. Mansfield E., Tyner K., Poling C., **Blacklock J.**, *Determination of nanoparticle surface coatings and nanoparticle purity using microscale thermogravimetric analysis*, Anal Chem, 86(3), 1478-1484 (2014).
16. Zou Y., Wan L., **Blacklock J.**, Oupicky D., Mao G., *In situ AFM analysis investigating disassembly of DNA nanoparticles and nano-films*, Methods Mol Biol, 948, 183-193 (2013).
17. Hume S., **Blacklock J.**, Jeerage, K., *Functionalized Nanoparticle Release and Distribution in PEG Hydrogel Delivery Systems*, 39th Annual Meeting & Exposition of the Controlled Release Society (2012).
18. Yan X., **Blacklock J.** et al., *One-Pot Synthesis of Polypeptide-Gold Nanoconjugates for in Vitro Gene Transfection*, ACSNano 6(1), 111-117 (2011).
19. **Blacklock J.** et al., *Tuning the Mechanical Properties of Bioreducible Multilayer Films for Improved Cell Adhesion and Transfection Activity*, Biomaterials 31(27), 7167-7174 (2010).
20. Volodkin D. V., **Blacklock J.** et al., *IR-light Triggered Delivery from Micron-sized Polymer Bio-coatings*, J Control Release, 148(1), 70-71 (2011).
21. **Blacklock J.** et al., *DNA Release Dynamics from Reducible Layer-by-Layer Films*, Langmuir, 26(11), 8597-8605 (2010).

22. **Blacklock J.** et al., *Cross-linked Layer-by-Layer Films of Reducible Polycation and DNA for Increased Cell Adhesion and Transfection Expression*, J Phys Chem B, 114(16), 5283-5291 (2010).
23. **Blacklock J.** et al., *Efficient Transgene Expression in vitro and in vivo from DNA-containing Reducible LbL Films*, Biomaterials, 30(5), 939-950 (2009).
24. Volodkin D.V., **Blacklock J.** et al., *Surface-supported Multilayers Decorated with Bio-active Material Aimed at Light-triggered Drug Delivery*, Langmuir, 25(24), 14037-14043 (2009).
25. **Blacklock J.** et al., *Disassembly of Layer-by-Layer Films of Plasmid DNA and Reducible Tat Polypeptides*, Biomaterials, 28(1) 117-124, (2007).
26. **Blacklock J.** and Mao G.H., *Self-Assembly and Crystallization in Nanoscale Confinement*, NSF Supplementary Grant (2007).
27. **Blacklock J.** and Mao G.H., *IREE Report, NSF Supplementary Grant* (2007).

RECENT CONFERENCES AND PRESENTATIONS

- | | |
|------|----------------------------------------------------------------------------------------------|
| 2019 | MS&T Conference ▪ Portland, OR, USA |
| 2019 | NSF-DMTL Workshop ▪ Orlando, FL, USA |
| 2019 | NSF Synthesis & Design Workshop - Digitally-Mediated Team Learning (DMTL) ▪ Orlando FL, USA |
| 2019 | ASEE National Conference ▪ Tampa, FL, USA |
| 2019 | NSF-RFE workshop ▪ Washington DC, USA |
| 2019 | Lockheed, Boeing, Stratasys - Industry presentations for promoting Adv Manufacturing Program |
| 2017 | NAE-CEES ▪ Washington DC, USA |
| 2016 | ASEE National Conference ▪ New Orleans, LA, USA |
| 2016 | AccessEngineering ▪ Seattle, Washington, USA |
| 2016 | LEAN LaunchPad ▪ Santa Cruz, CA, USA |
| 2015 | ASEE National Conference ▪ Seattle, WA, USA |
| 2015 | ASEE Rocky Mountain Section ▪ Denver, CO, USA |
| 2015 | Pathways to Innovation Workshop ▪ Scottsdale, AZ, USA |
| 2014 | NETI ASEE-A Workshop ▪ New Orleans, LA, USA |
| 2013 | ABET ▪ Portland, OR, USA |

FELLOWSHIPS

- | | |
|-----------|------------------------------------------------------------------------------------------------------------------------------------------|
| 2019 | NSF - DTLM: Conference and workshop focused on online and group learning
Orland, FL |
| 2017 | NAE-CEES Workshop Fellowship
Nation Academies ▪ Washington, DC, USA |
| 2016 | AccessEngineering Fellowship
Washington University ▪ Seattle, WA, USA |
| 2015-2016 | Pathways to Innovation Fellow
Lean LaunchPad ▪ Santa Cruz, CA, USA |
| 2010-2011 | National Research Council (NRC) Postdoc Materials Engineer
National Institute of Standards and Technology (NIST) ▪ Boulder, CO, USA |

- 2011 NSF Fellowship Summer Institute on Nanotechnology in Cancer
University of Houston Medical Center ▪ Houston, TX, USA
- 2009 Max Planck Fellowship for International Research | Post-Doctoral Researcher
Max Planck Institute (Colloids and Interface Department) ▪ Potsdam, Germany
- 2008 Fulbright Fellow | Graduate Researcher
Max Planck Institute (Colloids and Interface Department) ▪ Potsdam, Germany
- 2008 National Science Foundation (NSF-IREE) Grant ▪ MPI, Potsdam, Germany
- 2007 National Science Foundation (NSF-IREE) Grant ▪ DESY, Berlin, Germany
- 2007 Guest Fellow | Graduate Researcher
Paul Scherrer Institute (Neutron Scattering) ▪ Villigen, Switzerland

ADVISING

Ph.D. Students (committees): 5 total + 1 recent graduate from CU-Denver

Katherine Pickens McConnell (PhD): *Structural and cultural influences on career development in CU Boulder's department of Mechanical Engineering* (2019).

M.S. Students (co-advisor): 6

Undergraduate advisees (current): 75 undergraduate and 10 graduate

MENTORING

2018-current CARE faculty support – Colorado School of Mines

2013-2015 Co-Founder of Coalesce Building Academy (<http://www.boulderbuildacademy.com/>)

2011-2015 I have a dream foundation (Under-represented high-school students)

PROFESSIONAL SERVICE

2019-current Girls Lead the Way | ME Chair

2019 PDAT – Colorado Additive Day | Panelist

2019-current Smart Manufacturing Online Graduate Certificate Program | Director

2018-current ME Undergraduate Curriculum Committee | Chair

2018-current Advanced Manufacturing Program | Associate Director

2018-current ME Program Assessment | Chair

2017-2018 Strategic Action Committee (CU-Boulder), College | Member

2017-2018 Assessment Committee (CU-Boulder), College | Member

2017-2018 Undergrad Committee (CU-Boulder) | Member

2017-2018 SEE Initiative (CU-Boulder) | Chair

2016-2017 Field Session Campus Committee | Member

2015-2017 CECS Curriculum Committee | Member

2014 Fox31 Interview about Robotics at Mines

2014-2016 TechFee Committee | Member

2014-current CEC Women's Advisory Board | Miami University, Oxford OH | Member

2014 ArcelorMittal Annual Student Tour | Gary, IN

2014 Mines Spring Graduation | Speaker

2013-2016 ABET assessment for Mechanical Engineering Department | Chair

2013-2016 Undergraduate Recruitment Committee | Member
2013-2017 Undergraduate Curriculum Committee (Mechanical Engineering Department) | Chair
2012 NSF Nanomanufacturing: Colloids, Fluidics and Bio-Nanostructures | Reviewer

**ACTIVE PROFESSIONAL
AFFILIATIONS**

2012 - current ASEE member, presenter, reviewer and panel monitor