

# Catherine Marie Hamel

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## Academic Appointments at UMD

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**Senior Lecturer, Keystone Program** *August 2018 - Present*

- Develop, coordinate and instruct various courses taught by the Keystone Department
  - ENES232 Thermodynamics – *Actively teaching*
  - ENES100 Introduction to Engineering Design – *Actively teaching*
- Lead ENES232 Thermodynamics instructional team as the Course Coordinator

**Adjunct Lecturer, Fire Protection Engineering (FPE) Department** *August 2019 – Present*

- Develop the course curriculum and instruct senior undergraduates and graduate students in the FPE Department for ENFP405/621 Structural Fire Protection

**Instructor, Women in Engineering (WIE)** *July 2019 - Present*

- Instruct high school and freshman women-identifying students in various programs and courses
  - ENES115 FLEXUS Seminar– *Fall 2021*
  - WIE Change the World: An Introduction to Engineering Program – *Summer 2021*
  - Exploring Engineering Summer Program – *Summer 2019*

## Other Employment

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*AcuTech Group Inc.*

**Associate Engineer  
Engineer**

*April 2018 – August 2018  
January 2016 – April 2018*

- Advised high-risk chemical and petrochemical facilities on their process safety management programs and instructed how they can reduce their safety or security risks at their facility
- Developed emergency response plans for high-risk facilities
- Ran and analyzed complex consequence modeling cases for accidental or intentional releases leading to fire, smoke, explosion, and toxic exposures
- Conducted safety and security risk assessments for chemical and petrochemical companies, including for water-front facilities requiring approval by the U.S. Coast Guard

*Department of Fire Protection Engineering, A. James Clark School of Engineering*

**Graduate Research Assistant**

*June 2015- December 2016*

- Worked with Prof. Stanislav Stoliarov to fortify a non-intrusive method for temperature and radiative fraction measurements in laminar flames of gaseous and solid fuels

**Graduate Teaching Assistant (TA), Risk-Informed Performance-Based Design**

*January 2016- May 2016*

- Assisted in the teaching, grading and advising of senior students in ENFP411 as they prepared a risk-based performance-based fire protection design for their capstone course

**Undergraduate TA, ENFP320 Fire Assessment Methods and Laboratory**

*January 2015-May 2015*

- Assisted in the development and carrying out of ASTM-standard fire laboratories for junior-level students
- Guided students while they write lab reports, and grade these reports, in addition to bi-weekly quizzes

**Undergraduate Teaching Fellow (TF), Heat and Mass Transfer Processes**

*January 2013-May 2015*

- Served as a UTF for both the Mechanical Engineering (ENME332: 1/2013 – 5/2015) and Fire Protection (ENFP312: 9/2014-12/2014) offerings, assisting with teaching, office hours, grading, and logistics
- In ENFP312, led 16 students through practice problems during weekly discussion sessions, graded weekly homework and two numerical analysis projects, held weekly office hours and held exam review sessions
- Taught heat transfer applications of MATLAB to students for their use during the numerical analysis projects

**Fire Protection Engineering (FPE) Undergraduate Research Mentor**

*September 2013-May 2014*

- Managed team of sophomores conducting group research on beam smoke detectors and nuisance rejection
- Served as liaison between the research team and Xtralis, whose product was being tested during the project

CERIB Concrete Industry Study and Research Center, Epernon, France

**Fire Testing Center Intern**

August 2014

- Conducted a comparative analysis of equivalent steel and concrete design buildings using the MATLAB program developed at Imperial College, analyzing the structural integrity of the structural members under consideration

Imperial College London, London, UK

**Undergraduate Research Assistant**

June 2014-July 2014

- Helped fortify a finite-difference analysis tool using MATLAB to study the temperature gradients of travelling fires within concrete and steel members and determine the temperature distributions throughout these structural members

Department of Mechanical Engineering, A. James Clark School of Engineering

**Undergraduate TF, ENME332 Heat and Mass Transfer Processes**

January 2014 – December 2014

- Assist in the instruction of Transfer Processes for over 150 mechanical engineering students by holding weekly office hours, grading homework and examinations, and hosting review sessions for exams

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**Education**

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University of Maryland, College Park, MD

A. James Clark School of Engineering

Fire Protection Engineering (M.S. December 2016, B.S. May 2015)

M.S./B.S. GPA: 4.0/3.93

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**Books Authored**

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**Co-Author and Editor** – *Center for Chemical Process Safety Guidelines - Revision*

Center for Chemical Process Safety. (2019). *Guidelines for Inherently Safer Chemical Processes: A Life Cycle Approach, 3<sup>rd</sup> Edition*. Retrieved from <https://www.aiche.org/ccps/resources/publications/books/guidelines-inherently-safer-chemical-processes-life-cycle-approach-3rd-edition> ISBN: 978-1-119-52922-4.

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**Refereed Journal Articles**

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Hamel, C., Raffan, F., & Stoliarov, S., “A method for measurement of spatially resolved radiation intensity and radiative fraction of laminar flames of gaseous and solid fuels,” *Experimental Thermal and Fluid Science*, Vol. 104, p. 153-163, 2019.

Rackauskaite, E., Hamel, C., Law, A., Rein, G., “Improved Formulation of Travelling Fires and Application to Concrete and Steel Structures,” *Structures*, Vol. 3, p. 250-260, 2015.

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**Published Conference Proceedings**

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Hamel, C. M., & Eagle, W. E. (2020, June), *The Conceptual Fluency Approach for Introductory Thermodynamics*. Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual Online . 10.18260/1-2—35299

Hamel, C.M. (2017, February), *A Method for Measurement of Spatially Resolved Radiation Intensity and Radiative Fraction of Laminar Flames of Gaseous and Solid Fuels*. Paper presented at 2017 Fire and Materials Conference, San Francisco, USA.

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**Conference Presentations**

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Hamel, C.M., & Eagle, W.E. (2020, June), *The Conceptual Fluency Approach for Introductory Thermodynamics*. Presentation at 2020 ASEE Virtual Annual Conference, Virtual Online.

Hamel, C.M. (Presenter), Raffan-Montoya, F., & Stoliarov, S. (2017, April), *A method for measurement of spatially resolved radiation intensity and radiative fraction of laminar flames of gaseous and solid fuels*. Presentation at the 2017 10<sup>th</sup> US National Combustion Meeting, College Park, MD.

Moore, D.A. & Hamel, C.M. (2017, October), *Achieving Excellence in PSM Through Competency*. Presented at 2017 CCPS Middle East Process Safety Conference, Bahrain International Exhibition and Convention Centre.

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## Grants and Funded Research

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National Science Foundation (NSF #2013268), *Investigating the Effects of a Mastery-based Assessment Approach on Undergraduate Engineering Education*, \$199,996. 08/01/2020 – 07/31/2022. Senior personnel.

University of Maryland Office of the Senior Vice President and Provost. *Teaching Innovation Grant: Adaption of Introduction to Thermodynamics to an Online Environment*, \$11,625. 06/18/2020 – 9/30/2020. Grant Lead.

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## Courses Taught [Enrollment shown]

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ENES232: F18 [97], S19 [56], F19 [45], S20 [174 (1/2 online)], F21 [111], S22 [100]

ENES232 ONLINE: Sum20 [42], F20 [112], S21 [99], Sum21 [25]

ENES100: S19 [80], S22 [40]

ENES115: F21 [30]

ENFP405: F19 [37], F20 [20 (online)]

ENFP621: F19 [9], F20 [14 (online)]

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## Instructional Workshops Established

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**Training Developer and Implementor, Engineering IT, Clark School of Engineering** August 2020

- Developed, recorded, edited and shared a demonstration video and training for “Using an iPad Pro and Apple Pencil with Zoom for Content Delivery” for the Engineering IT Department
- Demo can be accessed on EIT’s website here: <https://ask.eng.umd.edu/105098>

**Training Developer and Co-Facilitator, Engineering IT, Clark School of Engineering** March 2020

- Coordinated with Dr. Patrick McAvooy and Kevin Calabro to develop, organize and deliver an online webinar training on “Using Gradescope with Canvas” for Engineering Faculty Members
- Development of this training was expedited by the onset of COVID-19, and the training was instrumental for allowing some engineering faculty to migrate to an online teaching environment for exams and grading
- Demo can be access on EIT’s website here: <https://ask.eng.umd.edu/page.php?id=99216>

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## Mentorship

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**Faculty Mentor, Salamander Honor Society, Beta Chapter, FPE, UMD** August 2020

- Proposed a research topic, mentored and supported two ‘newts’ during their research project for induction into Salamander, the Fire Protection Engineering Honor Society
- Met with the pair to assist with research, review their paper, practice their presentation, and finally watch their presentation on Fire/Explosion Risk of Chemical Storage

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## Course or Curriculum Development

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**Developer and First-time Implementor of Conceptual Fluency at UMD** August 2019 - Present

- Developed, implemented and lead the instructional team for ENES232 in a new assessment approach at UMD called the Conceptual Fluency Approach
- Assisted with the development of the Conceptual Fluency Approach being implemented in other Keystone courses

**Online Canvas Module and Level 1 Conceptual Quiz and Question Bank** June 2020 – September 2020

- Directed a team of undergraduate and graduate students to develop a brand-new Canvas training module for teaching a numeric solver software, Engineering Equation Solver (EES)
- Managed a team of undergraduate and graduate students to integrate Level 1 Conceptual Questions into an online question bank and online quizzes that allowed randomization and multiple attempts by users

**Computational Thinking Assessments, Keystone Program** June 2019 – August 2019

- Analyzed the exposure to and progression through computational thinking for all departments in the Clark School
- Developed a survey for incoming Clark students to assess their exposure to computational thinking concepts
- Drafted example computational thinking projects that could be integrated into Keystone courses

## **Workshops Attended to Improve Instruction**

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- Workshop on Active Learning Techniques for Large Classes, TLTC UMD** October 2021  
Participated in a 75-minute workshop to develop techniques for integrating active learning tools into ENES232
- Ta-Da Workshop, Academy for Innovation and Entrepreneurship** Summer 2019
- Participated in a week-long workshop (by-invite), dedicated to redesigning ENES100 for STS Students
- Workshop on Alternate Summative Assessments for Online Courses, TLTC UMD** October 2021
- Participated in a workshop to develop alternate and creative options for midterm and final exams in online courses while instructing online during the COVID-19 pandemic

## **Guest Lecture**

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- Guest Lecturer, ENES115/ENES113, WIE Clark School of Engineering** Fall 2019, Fall 2020
- Developed and facilitated a special lecture on *Implicit Bias and Group Dynamics in Engineering* for the first-year seminar course for Flexus and Virtus

## **Committees and Campus Service**

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- Course Coordinator – ENES232 Thermodynamics, Keystone Program** 1/2019 - Present
- Coordinate facilitation of ENES232, which includes directing 1-4 faculty members, 4-6 UTFs, and 2-4 GTAs in a given semester
  - Administer the training of UTFs and GTAs; aid Keystone with the selection of UTFs and GTAs; schedule and facilitate weekly meetings; manage the course PORTAL on Canvas and publish all student-facing documentation; coordinate with non-faculty parties for demonstrations or off-site visits
- Curriculum Advisory Committee, Fire Protection Engineering Department** January 2018 – Present
- Work alongside a group of 20 industry experts to review and provide feedback on the direction of the academic program of the Fire Protection Engineering Department at the University of Maryland
- Transfer Course Evaluator – ENES232 Thermodynamics, Keystone Program** 8/2019 – 12/2020
- Responsible for reviewing all Thermodynamics offerings from other institutions to make a determination on equivalency to ENES232 at UMD

## **External Service and Consulting**

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- Strategic Planning Committee, Elizabeth Seton High School** January 2019-June 2019
- Assisted the Board of Trustees for Elizabeth Seton High School with the Strategic Plan for the high school
  - Led the Student/Alumnae Subcommittee to examine the role of current students and alumnae in order to understand the strategic goals that needed to be established to enhance the student experience and connect alumnae to the school
- Elizabeth Seton High School LEAD Program Advisory Board** September 2012 – May 2016
- As a Founding Board Member, worked with a board of engineering and education professionals to enhance the LEAD Engineering Program at Elizabeth Seton High School, my alma mater, and serve as an E-Mentor for Seton students
  - Bridged together the FPE program to the LEAD program, introducing a fire design competition with Seton students