

CURRICULUM VITAE

CV SECTION 1: Employment History/Awards

NAME Steve Benoit

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EDUCATION

2011 Ph.D. (Mathematics), Colorado State University
2006 MS (Mathematics), Colorado State University
1990 BS (Physics), Rose-Hulman Institute of Technology
1990 BS (Electrical Engineering), Rose-Hulman Institute of Technology

ACADEMIC POSITIONS

2014 - 2020 Special Assistant Professor / Assistant Professor, Mathematics, Colorado State University
2013 - 2014 Administrative Professional, Mathematics, Colorado State University
2011 - 2013 Postdoctoral Fellow, Mathematics, Colorado State University
2011 Postdoctoral Fellow, Mathematics, University of New Mexico

OTHER POSITIONS

2007 - President - Beken Learning Systems, Inc.
2013 - 2014 Regional President - Society for Creative Anachronism, Inc.
2002 - 2004 President - NANI Games International, LLC
1999 - 2008 Chief Technology Officer, National Amusement Network, Inc.
1990 - 1999 Engineering Systems Engineer - Electronic Data Systems, Inc.

CURRENT JOB DESCRIPTION

Current Effort Distribution (2019 and 2020):

50% Teaching 0% Research/Creative Activity 20% Service/Outreach 30% Admin

Prior Effort Distribution (2016, 2017, 2018)

65% Teaching 15% Research/Creative Activity 20% Service/Outreach

I am the co-director of the Precalculus Center, where my colleagues and I manage and deliver precalculus courses for both resident and distance students. This involves approximately 5,500 students each year, where each student takes from one to five 1-credit courses. I help manage a staff of two graduate students, a collection of undergraduate course assistants, and starting in Fall 2020, some part-time adjunct faculty members. As the faculty member assigned to the Precalculus Center, I am also responsible for the precalculus curriculum and course materials.

I also manage the department's math placement program and web sites, as well as a collection of placement tutorials that allow incoming students to improve their placement result through study and a proctored exam.

I create and maintain software that delivers all course assignments and exams, as well as all placement and tutorial exams, and the various web sites used by students to access their courses and the math placement process.

HONORS AND AWARDS

- 2008 Albert C Yates Research Fellowship
2007 – 2008 Outstanding Graduate Teaching Assistant, Dep. of Mathematics, Colorado State University

CV SECTION 2: Publications/Scholarly Record

PUBLISHED WORKS

Refereed Journal Articles:

1. S. Benoit and S. R. J. Brueck, 2018, "Design of Chirped Gratings Using Interferometric Lithography", In IEEE Photonics Journal, vol. 10, no. 2, pp. 1-13, impact factor 2.74, cited by 4.
2. X. He, S. Benoit, R. Kaspi and S. R. J. Brueck, 2016, "Optically Pumped Continuously Tunable Mid-IR Distributed-Feedback Semiconductor Laser," In IEEE Journal of Quantum Electronics, vol. 52, no. 10, pp. 1-10, impact factor 1.852, cited by 5.
3. S. Benoit, D. D. Holm and V. Putkaradze, 2011, "Helical states of nonlocally interacting molecules and their linear stability: a geometric approach", In Journal of Physics A: Mathematical and Theoretical, vol. 44, no. 5, pp 1-28, impact factor 1.564, cited by 8.

Textbooks:

1. Paul Kennedy, Wade Ellis, Steve Benoit (2007) **College algebra in context I**, Kendall-Hunt Publishing Company; e-text
2. Paul Kennedy, Wade Ellis, Steve Benoit (2007) **College algebra in context II**, Kendall-Hunt Publishing Company; e-text
3. Paul Kennedy, Wade Ellis, Steve Benoit (2007) **Logarithmic and Exponential Functions**, Kendall-Hunt Publishing Company; e-text
4. Paul Kennedy, Wade Ellis, Steve Benoit (2007) **Numerical Trigonometry**, Kendall-Hunt Publishing Company; e-text
5. Paul Kennedy, Wade Ellis, Steve Benoit (2007) **Analytic Trigonometry**, Kendall-Hunt Publishing Company; e-text

Non-Refereed Journal Articles/Chapters/Proceedings/Transactions:

1. Benoit, Steve, Putkaradze, Vakhtang (2010) "Mathematical modeling of biological events and cell-cell communication" In Slovenian veterinary research, vol. 47., no. 4, online.
2. Paul Kennedy, Wade Ellis, Janet Oien, and Steve Benoit, 2007, "Mastery with Meaning: Access to Mathematics Online", In Mathematics and Computer Education, vol. 41, no. 2, pp 118-126.

CONTRACTS & GRANTS

Externally-Funded Projects as Investigator or role other than PI or CoPI

- 2009 "A Multi-Disciplinary Research and Teaching Program in Biomedical Engineering for Discovery and Understanding of Cell", PI was Tom Chen (ECE), CoPIs were Stu Tobet (Biomed Sci) and Michael De Miranda (Educ), NSF grant #0841259, \$2,665,273.

I served as a research fellow. The goal of the grant was to communicate university-level research to a K-12 audience and engage them with authentic scientific research. I worked with Math and Biology

teachers at University Schools (a K-12 school in Greeley) to help students to design and conduct experiments that would mirror, at a basic level, the science involved in cell communication, and then to present their results in poster form at an event at CSU. As part of this, I gave several lessons in each of the teachers' classrooms.

Internally-Funded Awards

- 2020 "Prototype and pilot of online live help system for PACe program" (I served as PI). Funded by Provost's office as part of the Digital Learning Initiative, \$19,742.
- 2019 "Enhancing Math Placement Messaging" (with Gaye DiGregorio, Jess Hagman, and Lois Samer). Funded by Provost's office as part of the Student Success Initiative 2, \$20,000.

Un-Funded Projects as PI or CoPI

- 2019 "Equity in Math by Design: Redesigning Introductory Mathematics at CSU", CoPIs were Jess Hagman and Steve Benoit, funded by the CSU office of the president, as part of the Race, Bias, and Equity Initiative, \$150,000.

PAPERS PRESENTED/ SYMPOSIA/ INVITED LECTURES/ PROFESSIONAL MEETINGS/ WORKSHOPS

1. Feb. 11, 2021, "The Precalculus Center: Building an Inclusive Campus Environment", APLU Student Experience Project, Winter Convening. Invited talk.
2. Oct. 2, 2018, "Design of Chirped Gratings Using Interferometric Lithography", IEEE Photonics Conference, Reston VA, presented research paper.
3. Sep. 30, 2017, "Modeling of Chirped Gratings based on Interferometric Lithography", SIAM Central States Section conference, Colorado State University, Fort Collins, CO, mini-symposium.
4. Apr. 14, 2012, "Proctored & Unproctored Placement Testing Tailored to Curriculum", with David Anton (Univ. of Wyoming), Mathematical Association of America, Rocky Mountain Section, Regional Meeting, Denver, CO. Invited talk.
5. Dec. 14, 2011, "Models of cell dynamics and intercellular communication", Center for High Tech Materials, University of New Mexico, Albuquerque NM. Presented research paper.
6. Aug. 23, 2010, "Mathematical modeling of biological events and cell-cell communication", University of Ljubljana, Slovenia. Presented research talk as part of the "Understanding Cell Communication using Modern Microelectronics" workshop.

OTHER ACTIVITIES/ACCOMPLISHMENTS REPRESENTING CONTRIBUTIONS TO THE DISCIPLINE

1. Software system that I developed for precalculus courses has been licensed for commercialization through CSU Ventures - license agreement executed June 27, 2020. Licenses include:

CSURF# 06-039: "Online Instructional/Assessment Platform" and any intellectual protection applications filed thereon.
CSURF# 2020-039: "PACe and Placement System Updates," and any intellectual protection applications filed thereon.
2. Member of the Organizing Committee for SIAM Central States Section conference, September, 2017.

3. "Method and Apparatus for Fabrication of Controlled Chirp Gratings", With Steven R. J. Brueck and Xiang He, University of New Mexico, U.S. Patent No. 9,431,789 B2 issued Aug. 30. 2016.
4. "Method and Apparatus for Fabrication of Controlled Chirp Gratings" With Steven R. J. Brueck and Xiang He, University of New Mexico, U.S. Patent No. 8,908,724, issued Dec. 9. 2014.

CV SECTION 3: EVIDENCE OF TEACHING AND ADVISING EFFECTIVENESS

TEACHING:

<u>Year</u>	<u>Semester</u>	<u>Course No./Title</u>	<u>Cr. Hrs.</u>	<u>Enrollment</u>	<u>SCH</u>
2016	Spring	MATH 117* - College Algebra I (CE)	1	11	11
2016	Spring	MATH 118* - College Algebra II (CE)	1	7	7
2016	Spring	MATH 124* - Logs & Exponent. (CE)	1	12	12
2016	Spring	MATH 125* - Numerical Trig. (CE)	1	8	8
2016	Spring	MATH 126* - Analytical Trig. (CE)	1	5	5
2016	Spring	MATH 160* - Calculus for Sci/Eng I (CE)	4	10	40
2016	Spring	MATH 161* - Calculus for Sci/Eng II (CE)	4	4	16
2016	Spring	MATH 369 - Linear Algebra (RI)	3	40	120
2016	Summer	MATH 117* - College Algebra I (DCE)	1	99	99
2016	Summer	MATH 118* - College Algebra II (DCE)	1	105	105
2016	Summer	MATH 124* - Logs & Exponent. (DCE)	1	97	97
2016	Summer	MATH 125* - Numerical Trig. (DCE)	1	80	80
2016	Summer	MATH 126* - Analytical Trig. (DCE)	1	37	37
2016	Summer	MATH 160* - Calculus for Sci/Eng I (DCE)	4	49	196
2016	Summer	MATH 161* - Calculus for Sci/Eng II (DCE)	4	37	148
2016	Fall	MATH 117* - College Algebra I (CE)	1	17	17
2016	Fall	MATH 118* - College Algebra II (CE)	1	13	13
2016	Fall	MATH 124* - Logs & Exponent. (CE)	1	13	13
2016	Fall	MATH 125* - Numerical Trig. (CE)	1	7	7
2016	Fall	MATH 126* - Analytical Trig. (CE)	1	6	6
2016	Fall	MATH 160* - Calculus for Sci/Eng I (CE)	4	11	44
2016	Fall	MATH 161* - Calculus for Sci/Eng II (CE)	4	6	24
2017	Spring	MATH 117* - College Algebra I (CE)	1	21	21
2017	Spring	MATH 118* - College Algebra II (CE)	1	12	12
2017	Spring	MATH 124* - Logs & Exponent. (CE)	1	14	14
2017	Spring	MATH 125* - Numerical Trig. (CE)	1	6	6
2017	Spring	MATH 126* - Analytical Trig. (CE)	1	5	5
2017	Spring	MATH 160* - Calculus for Sci/Eng I (CE)	4	12	48
2017	Spring	MATH 161* - Calculus for Sci/Eng II (CE)	4	7	28
2017	Summer	MATH 117* - College Algebra I (DCE)	1	78	78
2017	Summer	MATH 118* - College Algebra II (DCE)	1	95	95
2017	Summer	MATH 124* - Logs & Exponent. (DCE)	1	100	100
2017	Summer	MATH 125* - Numerical Trig. (DCE)	1	93	93
2017	Summer	MATH 126* - Analytical Trig. (DCE)	1	43	43
2017	Summer	MATH 160* - Calculus for Sci/Eng I (DCE)	4	37	148
2017	Summer	MATH 161* - Calculus for Sci/Eng II (DCE)	4	34	136

2017	Fall	MATH 101 - Math for Social Sciences - developed online course			
2017	Fall	MATH 117* - College Algebra I (CE)	1	16	16
2017	Fall	MATH 118* - College Algebra II (CE)	1	19	19
2017	Fall	MATH 124* - Logs & Exponent. (CE)	1	15	15
2017	Fall	MATH 125* - Numerical Trig. (CE)	1	8	8
2017	Fall	MATH 126* - Analytical Trig. (CE)	1	4	4
2017	Fall	MATH 160* - Calculus for Sci/Eng I (CE)	4	15	60
2017	Fall	MATH 161* - Calculus for Sci/Eng II (CE)	4	1	4
2018	Spring	MATH 101 - Math for Social Sciences (CE)	3	32	96
2018	Spring	MATH 117* - College Algebra I (RI) †	1	551	551
2018	Spring	MATH 117* - College Algebra I (CE)	1	21	21
2018	Spring	MATH 118* - College Algebra II (RI) †	1	727	727
2018	Spring	MATH 118* - College Algebra II (CE)	1	16	16
2018	Spring	MATH 124* - Logs & Exponent. (RI) †	1	815	815
2018	Spring	MATH 124* - Logs & Exponent. (CE)	1	22	22
2018	Spring	MATH 125* - Numerical Trig. (RI) †	1	800	800
2018	Spring	MATH 125* - Numerical Trig. (CE)	1	13	13
2018	Spring	MATH 126* - Analytical Trig. (RI) †	1	250	250
2018	Spring	MATH 126* - Analytical Trig. (CE)	1	5	5
2018	Spring	MATH 141 - Business Calculus - co-developed online course with R. Narasimhan			
2018	Spring	MATH 160* - Calculus for Sci/Eng I (CE)	4	12	48
2018	Spring	MATH 161* - Calculus for Sci/Eng II (CE)	4	12	48
2018	Summer	MATH 101 - Math for Social Sciences (CE)	3	8	24
2018	Summer	MATH 117* - College Algebra I (RI) †	1	37	37
2018	Summer	MATH 117* - College Algebra I (CE)	1	82	82
2018	Summer	MATH 118* - College Algebra II (RI) †	1	60	60
2018	Summer	MATH 118* - College Algebra II (CE)	1	81	81
2018	Summer	MATH 124* - Logs & Exponent. (RI) †	1	81	81
2018	Summer	MATH 124* - Logs & Exponent. (CE)	1	94	94
2018	Summer	MATH 125* - Numerical Trig. (RI) †	1	102	102
2018	Summer	MATH 125* - Numerical Trig. (CE)	1	98	98
2018	Summer	MATH 126* - Analytical Trig. (RI) †	1	49	49
2018	Summer	MATH 126* - Analytical Trig. (CE)	1	33	33
2018	Summer	MATH 160* - Calculus for Sci/Eng I (CE)	4	30	120
2018	Summer	MATH 161* - Calculus for Sci/Eng II (CE)	4	40	160
2018	Fall	MATH 101 - Math for Social Sciences (CE)	3	25	75
2018	Fall	MATH 117* - College Algebra I (RI) †	1	1120	1120
2018	Fall	MATH 117* - College Algebra I (CE)	1	18	18
2018	Fall	MATH 118* - College Algebra II (RI) †	1	1382	1382
2018	Fall	MATH 118* - College Algebra II (CE)	1	12	12
2018	Fall	MATH 124* - Logs & Exponent. (RI) †	1	858	858
2018	Fall	MATH 124* - Logs & Exponent. (CE)	1	15	15
2018	Fall	MATH 125* - Numerical Trig. (RI) †	1	917	917
2018	Fall	MATH 125* - Numerical Trig. (CE)	1	3	3
2018	Fall	MATH 126* - Analytical Trig. (RI) †	1	409	409
2018	Fall	MATH 126* - Analytical Trig. (CE)	1	1	1
2018	Fall	MATH 369 - Linear Algebra (RI)	3	35	105
2018	Fall	MATH 484 - Supervised College Teaching	1	1	1
2019	Spring	MATH 101 - Math for Social Sciences (CE)	3	39	117
2019	Spring	MATH 117* - College Algebra I (RI) †	1	561	561
2019	Spring	MATH 117* - College Algebra I (CE)	1	23	23

2019	Spring	MATH 118* - College Algebra II (RI) †	1	703	703
2019	Spring	MATH 118* - College Algebra II (CE)	1	20	20
2019	Spring	MATH 124* - Logs & Exponent. (RI) †	1	741	741
2019	Spring	MATH 124* - Logs & Exponent. (CE)	1	14	14
2019	Spring	MATH 125* - Numerical Trig. (RI) †	1	795	795
2019	Spring	MATH 125* - Numerical Trig. (CE)	1	7	7
2019	Spring	MATH 126* - Analytical Trig. (RI) †	1	215	215
2019	Spring	MATH 126* - Analytical Trig. (CE)	1	2	2
2019	Spring	MATH 160* - Calculus for Sci/Eng I (CE)	4	13	52
2019	Spring	MATH 161* - Calculus for Sci/Eng II (CE)	4	17	68
2019	Spring	MATH 261 - Calculus for Sci/Eng III - co-developed online course with B. Sencindiver			
2019	Summer	MATH 101 - Math for Social Sciences (CE)	3	19	57
2019	Summer	MATH 117* - College Algebra I (RI) †	1	44	44
2019	Summer	MATH 117* - College Algebra I (CE)	1	104	104
2019	Summer	MATH 118* - College Algebra II (RI) †	1	68	68
2019	Summer	MATH 118* - College Algebra II (CE)	1	108	108
2019	Summer	MATH 124* - Logs & Exponent. (RI) †	1	77	77
2019	Summer	MATH 124* - Logs & Exponent. (CE)	1	106	106
2019	Summer	MATH 125* - Numerical Trig. (RI) †	1	82	82
2019	Summer	MATH 125* - Numerical Trig. (CE)	1	97	97
2019	Summer	MATH 126* - Analytical Trig. (RI) †	1	35	35
2019	Summer	MATH 126* - Analytical Trig. (CE)	1	35	35
2019	Fall	MATH 101 - Math for Social Sciences (CE)	3	34	102
2019	Fall	MATH 117* - College Algebra I (RI) †	1	1114	1114
2019	Fall	MATH 117* - College Algebra I (CE)	1	26	26
2019	Fall	MATH 118* - College Algebra II (RI) †	1	1397	1397
2019	Fall	MATH 118* - College Algebra II (CE)	1	14	14
2019	Fall	MATH 124* - Logs & Exponent. (RI) †	1	861	861
2019	Fall	MATH 124* - Logs & Exponent. (CE)	1	15	15
2019	Fall	MATH 125* - Numerical Trig. (RI) †	1	853	853
2019	Fall	MATH 125* - Numerical Trig. (CE)	1	10	10
2019	Fall	MATH 126* - Analytical Trig. (RI) †	1	359	359
2019	Fall	MATH 126* - Analytical Trig. (CE)	1	7	7
2019	Fall	MATH 345 - Differential Equations (w/Lab) (RI)	4	10	40
2020	Spring	MATH 101 - Math for Social Sciences (CE)	3	27	81
2020	Spring	MATH 117* - College Algebra I (RI) †	1	475	475
2020	Spring	MATH 117* - College Algebra I (CE)	1	24	24
2020	Spring	MATH 118* - College Algebra II (RI) †	1	614	614
2020	Spring	MATH 118* - College Algebra II (CE)	1	19	19
2020	Spring	MATH 124* - Logs & Exponent. (RI) †	1	734	734
2020	Spring	MATH 124* - Logs & Exponent. (CE)	1	14	14
2020	Spring	MATH 125* - Numerical Trig. (RI) †	1	729	729
2020	Spring	MATH 125* - Numerical Trig. (CE)	1	11	11
2020	Spring	MATH 126* - Analytical Trig. (RI) †	1	196	196
2020	Spring	MATH 126* - Analytical Trig. (CE)	1	4	4
2020	Summer	MATH 117* - College Algebra I (RI) †	1	77	77
2020	Summer	MATH 117* - College Algebra I (CE)	1	53	53
2020	Summer	MATH 118* - College Algebra II (RI) †	1	123	123
2020	Summer	MATH 118* - College Algebra II (CE)	1	53	53
2020	Summer	MATH 124* - Logs & Exponent. (RI) †	1	150	150
2020	Summer	MATH 124* - Logs & Exponent. (CE)	1	53	53
2020	Summer	MATH 125* - Numerical Trig. (RI) †	1	173	173

2020	Summer	MATH 125* - Numerical Trig. (CE)	1	48	48
2020	Summer	MATH 126* - Analytical Trig. (RI) ‡	1	76	76
2020	Summer	MATH 126* - Analytical Trig. (CE)	1	11	11
2020	Summer	Overall course coordination for all UG sections			
2020	Fall	MATH 117* - College Algebra I (RI) ‡	1	1059	1059
2020	Fall	MATH 117* - College Algebra I (CE)	1	57	57
2020	Fall	MATH 118* - College Algebra II (RI) ‡	1	1506	1506
2020	Fall	MATH 118* - College Algebra II (CE)	1	45	45
2020	Fall	MATH 124* - Logs & Exponent. (RI) ‡	1	896	896
2020	Fall	MATH 124* - Logs & Exponent. (CE)	1	28	28
2020	Fall	MATH 125* - Numerical Trig. (RI) ‡	1	950	950
2020	Fall	MATH 125* - Numerical Trig. (CE)	1	13	13
2020	Fall	MATH 126* - Analytical Trig. (RI) ‡	1	387	387
2020	Fall	MATH 126* - Analytical Trig. (CE)	1	12	12

* These courses are service courses with broad audience

(CE) denotes Continuing Education courses offered through CSU Online

(RI) denotes Resident Instruction sections, offered face-to-face

‡ These RI courses were co-taught at 33% after I assumed the role of Co-director of PACe program. Teaching was shared with Lois Samer (Co-director) and Anita Pattison (Assoc. director)

‡ These RI courses were co-taught at 50% after Lois Samer's retirement. Teaching was shared with Anita Pattison (Co-director)

Course Syllabi, Assignments, and Other Materials

Appendix 1 includes example materials from a face-to-face Differential Equations course I taught in Fall, 2019, and a face-to-face Linear Algebra course I taught in Fall 2018.

An appendix with sample materials from an online course is referenced under "Development of New Courses" below.

Student Course Surveys

Appendix 2 includes Course Survey results for three face-to-face course sections.

A survey from MATH 235 (a small-section course covering mathematical reasoning and introduction to proof techniques) had the following responses to questions that pertain to the instructor:

Prompt:	Excellent	Above Avg.	Others
How do you rate the instructor's knowledge of the subject?	10	0	0
How effectively did the instructor facilitate learning?	8	2	0
How do you rate the instructor's enthusiasm for teaching the subject?	7	3	0
How well did the instructor organize the course?	9	1	0
How prepared was the instructor for class sessions?	10	0	0
How do you rate the instructor's effectiveness at managing class sessions?	8	2	0
How do you rate the instructor's effectiveness at facilitating online and/or in-class interactions?	8	2	0
How do you rate the instructor's fairness and impartiality in the assignment of grades	10	0	0
How well did the instructor create an atmosphere that was respectful of student opinions, ideas, and differences?	10	0	0

How effectively did the instructor communicate?	9	1	0
How do you rate the availability of the instructor to help students outside of class	10	0	0
How do you rate this instructor?	9	1	0

A survey from a MATH 261 course (an Honors section of Engineering Calculus III) had similar results:

Prompt:	Excellent	Above Avg.	Others
How do you rate the instructor's knowledge of the subject?	15	1	0
How effectively did the instructor facilitate learning?	14	2	0
How do you rate the instructor's enthusiasm for teaching the subject?	12	4	0
How well did the instructor organize the course?	15	1	0
How prepared was the instructor for class sessions?	14	1	1
How do you rate the instructor's effectiveness at managing class sessions?	14	2	0
How do you rate the instructor's effectiveness at facilitating online and/or in-class interactions?	9	6	1
How do you rate the instructor's fairness and impartiality in the assignment of grades	16	0	0
How well did the instructor create an atmosphere that was respectful of student opinions, ideas, and differences?	16	1	0
How effectively did the instructor communicate?	12	3	1
How do you rate the availability of the instructor to help students outside of class	11	4	0
How do you rate this instructor?	15	1	0

Examples of Course Improvements

Over the past five years, I have work to improve the Precalculus course sequence significantly. In addition, I now oversee the math placement program and a series of non-credit tutorials to provide alternative paths to satisfy math prerequisites for students, and have worked to make many improvements to that process as well. I will summarize the improvements in each of these areas.

Precalculus Course Sequence:

This sequence includes the following one-credit courses:

- MATH 117 - College Algebra I
 - MATH 118 - College Algebra II
 - MATH 124 - Exponential and Logarithmic Functions
 - MATH 125 - Numerical Trigonometry
 - MATH 126 - Analytical Trigonometry
- I oversaw the development and production of new online instructional materials to replace old low-quality materials. This included designing the changes, working with graduate students to produce new video instruction, and encoding the resulting videos for web delivery.
 - I performed a thorough review of the program from the perspective of accessibility and made several changes to course web content to comply with WCAG guidelines. Course web content was also made responsive, to better support access from mobile devices.
 - A significant accessibility issue was the use of a Java-based tool for student homework and exams. This also created significant technical challenges for some students. I created a new assessment system based on pure HTML 5, but which preserved our investment in our item and

exam bank, delivering the existing exams and homework sets in a much more accessible way. This also significantly improved the ability for students to complete homework and take unproctored exams from mobile devices.

- These courses support several thousands of registrations each year, and providing students with personalized contact and support with limited staff is an enormous challenge. I have recently developed a system that defines a series of "touch points" during the semester, and at each touch point analyzes the student's current progress, including:
 - Are there any issue like prerequisites or holds that would prevent the student from working?
 - What has the student completed?
 - Does the student appear to be stuck, having tried some assigned work several times without success?
 - What should the student's next steps be?

Based on these factors, an email template is selected that speaks to the student's situation, and our staff personalized those emails with the student's name, the staff member's name and contact information, and sends those emails to students.

Grouping by template allows staff to efficiently contact about 3000 students in a Fall term, while still providing personalized messaging and advice for each student. Student response to this program has been overwhelmingly positive.

- In light of the COVID-19 situation, I have implemented mechanism to provide online support and help for students taking these courses. This consists of a combination of Canvas discussion groups and Microsoft Teams video conferences with Microsoft Whiteboard available for screen-sharing. Our course assistant staff monitor the online system as they are in the facility helping students face-to-face, and this has been working very well so far. I hope to continue this practice after the pandemic has been resolved and we return to more normal operations.
- I have organized meetings with departments on campus whose programs require precalculus courses (but not Calculus), to better understand what precalculus skills those programs need, and what deficiencies they are seeing in their students' preparation. This data will be a valuable resource when the course curricula are redesigned (a pending project).
- Finally, I have helped work on the design of a new physical space where our students work with course assistants to get help with their course content. Prior to this renovation, the facility was essentially a computer lab where students sat down and worked, and raised their hand when they had a question.

The newly renovated space is much brighter, more open, comfortable, and inviting. Fixed desktop computers have been removed, with laptop-friendly charging stations on each table, and laptops or iPads available for loan if students do not have one with them. This space encourages more interaction with course assistants, with rolling whiteboards, and includes two smaller side rooms that can be used for group sessions. During the design process, inclusivity and equity were a primary focus.

Math Placement and Tutorials Program

This program consists of a placement exam that can satisfy prerequisites for precalculus and calculus courses, and a series of no-credit (and no-cost) tutorials that students who need to satisfy a prerequisite can complete.

This program has been improved in a number of ways:

- I designed and built a new math placement web portal to provide information, answers to common questions, and links to the exam, tutorials, and resources for review and preparation. This new site is accessible and responsive and simplifies what had been a much more complex and outdated system.
- In addition, I created a new "My Math Plan" web site that incoming students are encouraged to use. This site asks students to select majors they may potentially be interested in pursuing, and then uses University Catalog data to design a recommended path for the student through mathematics to allow them to pursue any of those majors. This provides advice such as
 - What should the student have completed before arriving on campus (math placement, prerequisites satisfied for important first-semester courses, etc.)
 - What courses should the student plan to take in their first semester?
 - What should they plan to take in subsequent semesters to stay on track.

Students can "play" with several choices for major to see the impact on their math requirements, and can return to the site at any time to update their plan. This site was developed in close collaboration with the campus advising community and has been very well received (with an actual standing ovation in one large meeting of advisers!)

- In added an interface to the campus RamReady web portal for incoming freshmen to direct students to the Math Plan site if they have not yet completed their plan, and to show a checkmark on that step when completed. If the student's plan indicates they should complete the math placement process, that is also displayed as a step in the student's checklist (with a checkmark when placement is completed).
- A year ago, the math placement exam had two functions - when taken unproctored, it could only award credit, but when proctored, it could award course credit. This required it to be called the "Math Challenge Exam" in a proctored setting to comply with university rules on credit award, and this required some complicated and confusing messaging.

I have changed this system to break math placement (to satisfy prerequisites) apart from course challenge for credit, and created five new challenge exams (one per course) that students can use to challenge for credit. These exams are a much better assessment of student preparation than the small number of items on the placement exam, and has allowed simplification and clarification of placement-related messaging across campus. I worked with the offices of Admissions, the Registrar, Orientation and Transfer Programs, and the University Catalog to streamline messaging and ensure consistency and correctness in their web sites and print materials.

- I collaborated with Jess Hagman (Math faculty) and Gaye DiGregorio (head of our campus advising program) to thoroughly review all placement informational materials and web sites through the lens of equity and inclusivity, and made substantial changes to wording and language. For example, "Math Placement Exam" was renamed to "Math Placement Tool" to mitigate anxiety that the word "Exam" was causing in students. The results were a very significant increase in student completion of the math placement process before arriving on campus. These results have been documented in a paper, currently in peer review.

Development of New Courses

During the past 5 years, I have developed a new online MATH 101 (Math in the Social Sciences) course, and collaborated in the development of new online MATH 141 (Business Calculus) and MATH 261 (Calculus III for Scientists and Engineers) course.

These courses were all developed in collaboration with either a CSU Online or a TILT course developer, who mainly provided guidance on campus-wide conventions and standards, and reviewed content for adherence to those guidelines.

When developing an online course, I begin by documenting detailed learning objectives, then constructing a course outline and unit/objective structure to meet those learning objectives. I design the course so it can be delivered in any of three forms:

- as a 15-week course with a Final Exam week;
- as a 12-week course with a Final Exam week (either as a 12-week Summer course, or as a Fall/Spring course that begins in week 5, to provide some opportunity for late add or credit recovery);
- as an 8-week course with no Final Exam week (for use in the shorter summer session).

Based on that structure, I design the lessons, with the goal of meeting the same "contact time" as a face-to-face course. A lesson would consist of some recorded videos with lecture and/or worked examples, a collection of assessment items mapped to learning objectives, and supplemental content like practice problems with solutions. I also define a naming convention to organize the large number of content files that will be generated.

Finally, I record the video content, create written/web content, design assessments, and assemble module pages in Canvas.

Appendix 3 includes examples of course development materials that I created for MATH 261.

- A high-level spreadsheet that collects the online course module structure for the MATH 160, 161, and 261 Engineering calculus sequence.
- The course learning objectives
- The detailed design of each lesson within each module. These were provided to Ben Sencindiver who created the video lectures and worked examples.

Written Comments from Students

Appendix 2 includes student comments from course surveys, as well as e-mail comments I have received from students.

Some excerpts from student survey comments and personal emails:

"Excellent professor!"

"Benoit was a kind and considerate professor. Very knowledgeable and capable of explaining things in many different ways to help students. He is also adept at asking key questions to students in order to gauge their understanding."

"I particularly enjoyed when we were told about real world applications of linear algebra - it validated taking on the struggle necessary to do well in the class."

"Thank you for everything you did to make this semester a smooth and enjoyable experience. I took MATH 160 in the spring and had a dreadful time learning the theories and definitions for concepts as they were poorly explained by an unenthusiastic TA. However, your explanation and derivation of each concept was a more than welcomed change that I feel should become a staple within the department. There were countless times where I knew we were approaching content I struggled with previously, but you explained it exceedingly well. Within 8 weeks you taught me more than I could learn in 16 weeks and I truly feel you inspired a further learning for calculus within me."

Participation in Professional Development Activities Related to Teaching

I have attended the following CSU-sponsored Professional Development Institute (PDI) sessions

*Student Engagement
Science of Learning
Accessible Materials
Facebook Pedagogy
Video Assignments
Student-Centered Learning
Learning Analytics Working Group*

These sessions were short informational talks to raise awareness of pedagogical techniques. Many of these were applicable to both face-to-face and online courses.

I attended a TILT Short course, *Online Courses*, which laid out best practices for setting up an online course and effectively working with students in an online setting. Many of these techniques, as well as those provided as part of partnerships with TILT and CSU Online during course development, have improved by online courses, and created a more consistent experience for students across courses.

I also attended the TILT Summer Conference: *High-Impact Educational Practices Intersect With the Science of Learning*. This conference was very illuminating, with respect to the student's perceptions of how they should approach learning vs. how the research shows students best learn. I took away from this some useful techniques to help students recognize shortfalls in their study/practice habits and to embrace more productive practices like shorter, more-frequent engagement, repetition, recall practice, and learning through assessment.

Most recently, I am a member of the CSU team participating in the APLU's Student Experience Project, which focuses on a few proven research-based pedagogical methods to address equity and inclusivity and to promote student success. I am working to implement many of the recommended techniques throughout our precalculus course series, and will apply them in future course development.

ADVISING:

STUDENT ADVISING/GRADUATE SUPERVISION

To date, I have not had undergraduate advisees or served on a graduate student's committee.

Descriptions of Mentoring Activities

I have worked with two undergraduate students on research projects:

Erin Doan worked with me on her Senior Honors Thesis, which focused on neural networks and machine learning.

Thomas Lujan worked with me on an undergraduate research project on the occurrence of tonal intervals

in nature (such as birdsong) or languages with tonal characteristics (such as mandarin) that correlate to those in musical compositions.

CV SECTION 4: Evidence of Outreach/Service/Engagement

COMMITTEES

University Committee, year(s)

Faculty Council, ex-officio voting member, 2019 - 2020

Student Experience Project, 2020

Faculty Council Standing Committee on Non-Tenure Track Faculty (CoNTTF) 2016 - 2020
(Vice-chair since 2018)

CSU Online Advisory Board, 2016

Faculty Council Standing Committee on Teaching and Learning (CoTL) Task force on learning analytics, 2017

CSU Online Task Force on Proctoring, 2016

College Committee, year(s)

College NTTF Committee, 2016 - 2020

College Curriculum Committee, 2016 - 2020

College Commencement ceremony marshal, 2019 - 2020

Department Committee, year(s)

Search committee, 2020

Attended Executive Committee meetings relating to NTTF issues, 2018, 2020

PROFESSIONAL AFFILIATIONS AND ACTIVITIES

2019	Member of IEEE
2019	Member of IEEE Photonics Society
2019	Manuscript referee for IEEE Photonics Journal
2018 - 2020	Manuscript referee for Applied Optics
2018 - 2020	Member of World Wide Web Consortium (W3C) Community Group: Distributed User Interfaces
2018 - 2020	Member of W3C Community Group: Math on the Web
2018 - 2020	Member of W3C Community Group: E-Learning
2017 - 2020	Member of W3C Community Group: Accessible Online Learning
2017 - 2020	Member of W3C Community Group: Accessible Infographics

SERVICE WITH EXTERNAL PARTNERS AND COMMUNITIES

Submitted to Colorado Dept. of Transportation (CDOT) an analysis and projections of traffic patterns at intersection of CO Hwy 287 and N. Overland Trail to evaluate impact of truck traffic on highway safety due to proposed road access permit for gravel mining operations. CDOT ultimately denied the access permit and allowed a different access point to provide a safer traffic pattern.