

JOHN J. DUFFY EXCELLENCE IN TEACHING AWARD

Francis Burns

University of South Carolina Salkehatchie

PO Box 1337, 807 Hampton Street

Walterboro, SC 29488

843-549-6314, Extension 28681

fm burns@mailbox.sc.edu

Narrative

My teaching philosophy stems from my life's philosophy: "I will work to make the world a better place." I endeavor to empower students possessing few advantages of America's middle- and upper-income students. My teaching builds understanding, tolerance, and cooperation between individuals. Teaching is more than a job for me. It is part of my life's mission.

I provide my students with a "roadmap" for success: learning outcomes, formative assessment, homework, and summative assessment based upon the learning outcomes. Because my students possess the potential to deliver excellence, I have set a personal goal to increase the percent of successful chemistry students without sacrificing academic standards.

Over the past three years or so, my teaching has undergone major changes. First, I made student retention and success a major focus. As I was building momentum, the pandemic

slammed into humanity and USC

Salkehatchie. I was stunned by COVID-

19's impact, but I responded by developing

online curricula. As a result of my efforts, I

am observing improved student evaluations

– better than pre-pandemic. This is one

indicator of success (Figure 1). I work

diligently to improve student engagement,

pedagogy, and assessment. I also pursue scholarship on student retention and success. Most

students recognize my efforts. One student wrote, "Professor Burns is probably one of the best

teachers I have ever had. He inspired me every week with his comments to keep pushing and

going hard every week. I wish I could have him as a professor again! I hope he gets professor of

the year."

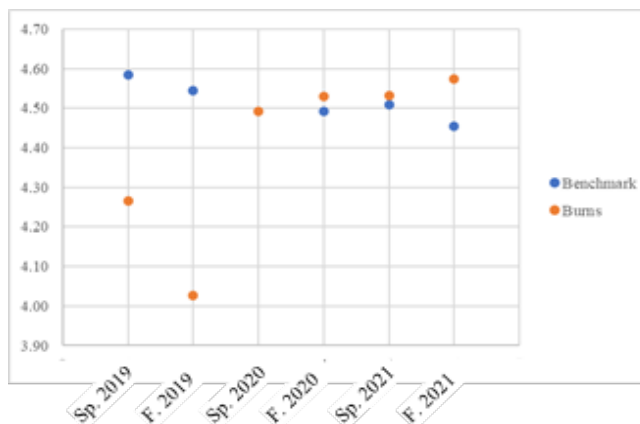


Figure 1: Student Evaluations between Spring 2019 and Fall 2021. Faculty average value is a weighted average combining multiple courses. The benchmark is the average value of all student evaluations collected at USC Salkehatchie. The benchmark was weight in the same manner as Dr. Burns' average values.

I taught only face-to-face (F2F) science courses prior to the pandemic. Unusual times require unusual efforts. I completed the Carolina Online Teaching & Learning (COLT) workshop from USC Columbia and became certified to teach online. As an experienced F2F/online instructor, I teach in an array of delivery methods: F2F, hybrid or mixed, and online (Table 1).

Class	Sections	Format
CHEM 102	2	F2F: lecture/lab
CHEM 107	2	FF2F: lecture/lab
CHEM 107	1	Mixed delivery: lecture/lab
CHEM 107	2	online: synchronous lecture/lab
CHEM 107	1	Online: asynchronous lecture and lab
CHEM 111/111L	2	F2F: lecture/lab
CHEM 112/112L	1	F2F: lecture/lab
CHEM 112/112L	2	Mixed delivery: lecture/lab
PCAM 299	1	Online: seminar for faculty

Table 1: The range of courses taught during the past three years. The instructional formats illustrate my flexibility to meet institutional and student needs.

When the pandemic upended my F2F instructional methods, I retooled for a post-pandemic America. I transformed my F2F course format to an online “flipped” format. Now I record my basic lecture notes using PowerPoint and embed polling questions for formative assessment. I upload them to VidGrid and set up in-video formative data collection ([2-minute sample](#)). Lecture has become largely Q & A sessions. I use a plethora of questions in both face-to-face and synchronous online meetings to actively engage my students. Poll Everywhere or Blackboard Collaborate easily collects formative assessment data. Most of the questions are asked by me, but I receive more student questions than I ever received in traditional face-to-face lecture formats.

I enjoy participating in and presenting at education conferences and workshops. At the CTE *Education Technology Showcase*, I presented classroom polling devices. I have served for three years on IT Curriculum committee and chair since Fall 2020. When COVID-19 upended instructional methods, I formed an ad hoc committee which organized a virtual “speed conference: *I didn't know that I could do that: technology, teaching, and tidbits*. Fourteen

presentations (20 minutes each) were squeezed into a few hours. I also organized a weekly seminar for Salkehatchie faculty: *Innovative Ideas and Technologies (PCAM 299)*. My colleagues and I learned about Blackboard Ultra Course View, Packback, VidGrid, Online Student Journals, and NearPod. Alan Kanapala became intrigued enough about online student journals to follow up with an email.

Because I value student engagement within my courses, I require student journals. This assignment makes students write a weekly progress report: (1) Learning activities completed, (2) reflection upon their week's work, and (3) plan for the coming week. This assignment serves two purposes. Students engage in metacognitive thinking. I also use the student journal for private communication. I respond to each submission. I have even recorded audio clips in lieu of typed replies. One of my students wrote: "He also cares about helping his students set up weekly schedules for themselves to stay on track with their work." I am testing Packback, which is a "social media" style discussion board. Student engagement is a leading indicator of student achievement.

Science laboratories occupy a special place and requires extra preparation and grading, but I want students to do science. Students get to handle real laboratory equipment and observe reality. I am a high contact professor in the laboratory, walking around and talking to students. Online labs are the new "reality," but I wanted to maintain quality. How to do remote laboratories? I use Science Interactive's lab kits for both chemistry and forensic science. How to recreate the interactive dynamics of the F2F laboratory? I have students take LOTS of pictures during their lab procedures, including a "safety selfie." Their selfies consist of a picture wearing safety glasses and disposable gloves. I mark student reports with vigor, but I permit revision and resubmission. This simulates my F2F critiques before students submit their reports.

How do I monitor student learning? I use various test instruments: diagnostic, standardized, and pre-/posttests. I also use student journal submissions, surveys, and lab reports.

I developed a pre-/posttest for forensic chemistry (CHEM 107) using representative questions from test banks. I administer the test at the beginning and end of the semester. My first semester had face-to-face delivery. I was pleased by the posttest results. Fall 2020 marked my first semester of fully remote CHEM 107: synchronous lecture & asynchronous labs. Despite my summer's

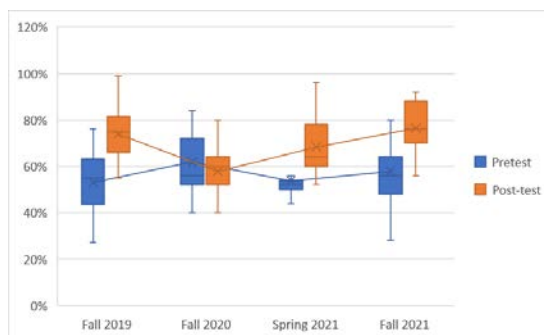


Figure 2: Box and whiskers plot of pretest and posttest results for CHEM 107. The middle 50% of the scores are represented by box. The top 25% is represented by the top line. The bottom 25% is represented by the bottom line. The mean value has been connected by line to show trends.

preparation, the semester was difficult. Posttest results illustrate this. Later semesters' posttest results improved due to my familiarity with online technology and student behavior.

Colleagues visit my classrooms, review my online courses, and evaluate my assessment instruments. Li Cai evaluated my assessment instruments during fall semester 2019. Dr. Cai concluded his evaluation with the following paragraph:

Overall, from my review of Professor Burns's syllabus, test #2, and learning outcome sheets, it is clear that he is an effective teacher and his CHEM 102 course is well designed. I would be happy to learn from his strategy of using chapter learning outcomes when revising my own test review sheets.

Although I have interests in other areas (e.g., environmental chemistry), I apply maximal effort towards improving student outcomes. I received a RISE grant in 2018: *Factors affecting Student Retention and Success in the USC Salkehatchie USC Rural Nursing Initiative*. Some results are not surprising, such as the significant relationship between class rank and student

success. Other results are more surprising, such as student success and retention are independent of participation in Salkehatchie's TRIO program. Transcript analysis provides only a slice of the student retention and success picture. As a result, I submitted a second RISE grant in 2021:

Qualitative Investigation of Student Retention and Success in the USC Salkehatchie USC Rural Nursing Initiative. If funded, Dr. Brandon Wright (Assistant Dean of Student Affairs at USC Salkehatchie) and I will be interviewing a subset of the students from my first RISE grant. We will be seeking relevant factors affecting student retention and success at Salkehatchie. The results have the potential to flagging factors affecting both our students' and campus' future.

With the aid of Bettie Obi-Johnson, I established a F2F CHEM 107 course at USC Salkehatchie. The pandemic pushed me to convert it to a remote course, which has had consistently good enrollment due to the course's quality and delivery method. After the pandemic ends, I want to offer CHEM 107 in two delivery methods: F2F and remote.

I worked with the Western Carolina Higher Education Commission, Palmetto College development office and Salkehatchie colleagues to receive a large USDA Rural Development grant (\$150,000). As the Principal Investigator for the federal grant, I will manage the purchase and utilization of forensic science equipment that includes optical microscopes, crime scene photographic equipment, a GCMS instrument, and Human DNA analytical equipment. The equipment will be used for CHEM 107 and continuing education courses for law enforcement. This is one of the largest teaching grants received by a faculty on our campus recently.

I am grateful that I have been given the opportunity to teach chemistry and forensics at UofSC Salkehatchie. My students and colleagues pushed me to go beyond good to excellent. One of my students quoted Alex Trenfor in a personal note, "The best teachers are those who show you where to look but don't tell you what to see."

Francis Marion Burns, Ph. D.

PROFESSIONAL EXPERIENCE

Assistant Professor of Chemistry, University of South Carolina Salkehatchie, 2017 to present

Teach pre-nursing chemistry, general chemistry, and forensic chemistry. Participate in scholarship and service activities.

Instructor of Chemistry, Diné College, 2015 to 2017

Taught general chemistry to Navajo community college students: one semester and two-semester courses. Participated in scholarship and service activities. Mentored students in undergraduate research activities.

Visiting Assistant Professor of Chemistry, Ferris State University, 2005-2011, 2012-2015

Taught general chemistry: one semester and two-semester courses. Supervised “peer-leader” discussion sections for general chemistry. Pursued chemical education research and student assessment activities.

Lecturer, Koya University, Kurdistan, Iraq, 2011 - 2012

Taught analytical and instrumental chemistry in English to Kurdish students. Engaged in environmental science research.

EDUCATION

Ph.D. in Analytical Chemistry. 1999. The University of Toledo, Toledo, Ohio

M.A. in Science Education. 1991. The Ohio State University, Columbus, Ohio

B.S. in Entomology. 1986. The Ohio State University, Columbus, Ohio

PEDAGOGICAL PUBLICATIONS

1. "Closing the Circle in Student Assessment and Learning." F.M. Burns. Published *Research in Chemical Education*, L. Mammino & J. Apotheker: Editors, **2021**, 97-112.
2. "The use of electronic media for chemical education research." F. M. Burns & D. Frank. *Chemistry Education and Sustainability in the Global Age* **2013**, 185-195.

PEDAGOGICAL PRESENTATIONS

1. “Flipped Classrooms: Teaching Students How to Learn,” Francis Burns, “I didn't know that I could do that: technology, teaching, and tidbits” virtual conference, University of South Carolina Salkehatchie, December 2021 (Contributed).
2. “Factors Affecting Retention and Success for Pre-nursing Students” Francis Marion Burns, Aaron Ard, NASPA Conferences on Student Success in Higher Education, Baltimore, MD, United States, June 29–July 1, 2020. (Conference canceled due to COVID-19).

3. "Assessing critical thinking skills through self and peer evaluation," Francis Burns 224th Conference of the Two-Year Chemistry Consortium, Miramar College, San Diego, California, August 2019 (Contributed).
4. "First-year research projects: solving problems and improving student performance," Francis Burns, 1st International Conference on Pure and Applied Science, Koya University, Kurdistan Iraq, April 2018 (Keynote).
5. "Do My Students REALLY Understand Me? Using Clickers for Formative Assessment," Francis Burns, Education Technology Showcase. University of South Carolina, April 2018 (Contributed).
6. "Assessing higher order thinking skills through creative writing," Francis Burns, Jesse Asare, and Letoia Clark, 2nd African Conference on Research in Chemical Education, Thohoyandou, South Africa, November 2015 (Invited).

WORKSHOPS, SYMPOSIA, & PROFESSIONAL DEVELOPMENT

1. "Getting Started with Learning Analytics" Online Course, Blackboard Academy, March 2021 (participant).
2. "I didn't know that I could do that: technology, teaching, and tidbits" virtual conference, University of South Carolina Salkehatchie, December 2021 (Chair).
3. Carolina Online Teaching & Learning (COLT) workshop, University of South Carolina Columbia, Summer 2020 (participant).

GRANTS

1. Primary Investigator for Rural Development Grant (\$150,000), *Forensic Lab equipment for the USC Allendale campus*, US Department of Agriculture (collaboration between USofC Salkehatchie and Western Carolina Higher Education Commission), 2021
2. RISE grant (\$8,000), *Factors affecting Student Retention and Success in the USC Salkehatchie USC Rural Nursing Initiative*, Office of the Vice President for Research, University of South Carolina, 2018

UNIVERSITY AND PROFESSIONAL SERVICE

University of South Carolina Salkehatchie

- IT and Computer Curriculum Committee, 2017 to present
 - Committee chair, 2020 to present.
- Palmetto College Science Assessment Committee Member, 2019 to 2022
- Internal Grants Reviewer (RISE and Magellan): 2019 to 2021.

University of Possibilities faculty mentor, USC Salkehatchie, Fall 2018

Magellan Grant faculty Mentor, USC Salkehatchie, 2017 and 2019

Nuclear Science Week faculty mentor, USC Salkehatchie, Fall 2019

High School Presentation Judge, South Carolina Academy of Sciences, 2017-2020