

It is an honor to be nominated for the Virgil Orr Junior Faculty Award, and I appreciate your consideration of my application. Please find supporting data and information below.

TEACHING

One of my core values in teaching is that rigorous academic standards must be maintained in our courses, to ensure that our graduates are well-prepared for the workforce and that their diploma has value. This often requires challenging students and motivating them to work harder and/or change their study habits from what they might be accustomed to previously. I have found that most students appreciate being challenged, especially when they feel that their teacher is really invested in them and cares about their learning, and I think that is reflected in my overall instructor rating in these classes. I also routinely score very well in the organization and clarity category of the evaluations, and am proud that students find me willing to answer their questions and rate me highly in that area as well. I go out of my way to make myself available to students outside of class to help them with material. Students regularly tell me that they appreciate my approachability and accessibility.

When assigning grades, I try to conform to the grading system described in the University Catalog (shown on the right), in which a grade of "C" is average and a grade of "A" is reserved for truly exceptional work. I believe this makes my grading more meaningful and provides students with appropriate and motivating feedback. Scholarly research of higher education indicates a correlation between student grades and teaching evaluation scores and that assigning lower grades to students results in lower scores in student evaluation of teaching<sup>[1,2,3,4]</sup>. In light of this, I am particularly proud to have received high ratings despite not being a lenient grader.

**Grading System**

Official grades are maintained in the University Registrar's Office. Louisiana Tech applies a traditional system of grading and awards quality points for grades earned. An "A" is awarded for the highest degree of excellence that is reasonable to expect of students of exceptional ability and application. A grade of "B" is superior. A grade of "C" is average. A grade of "D" is given for a quality of work that is considered the minimum for receiving credit for the course. A grade of "F" is given for a failure, and the work must be repeated to receive academic credit.

The following table provides information on the courses I have taught during the past six academic years (Fall 2013-present), including enrollment, grade distribution, and evaluation data. The data in the table reflect average values over this span. This table shows that I have taught a fairly large

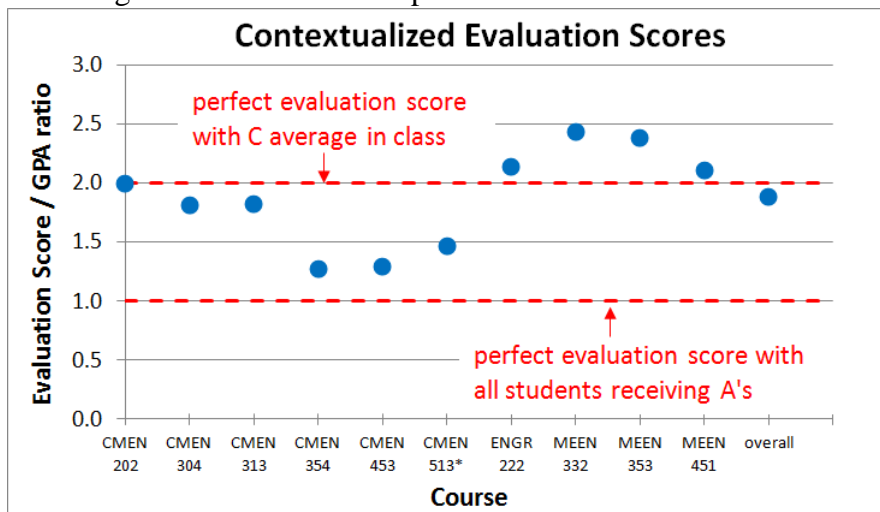
Course		sections taught	enrollment		grade distribution (%)						avg. GPA	average instructor rating	eval. / GPA ratio
			total	avg./ section	A	B	C	D	F	W			
Number	Title												
CMEN 202	Chem. Eng. Calculations	11	524	47.6	3.4	10.3	28.2	9.4	5.7	42.7	1.94	<b>3.87</b>	<b>2.00</b>
CMEN 304	Transport Phenomena	6	229	38.2	6.1	13.1	30.1	10.0	6.1	34.5	2.05	<b>3.71</b>	<b>1.81</b>
CMEN 313	Heat Transfer	5	141	28.2	4.3	12.8	46.8	6.4	1.4	28.4	2.17	<b>3.94</b>	<b>1.82</b>
CMEN 354	Chem. Eng. Junior Lab	5	74	14.8	10.8	81.1	8.1	0.0	0.0	0.0	3.03	<b>3.85</b>	<b>1.27</b>
CMEN 453	Chem. Eng. Senior Lab	6	87	14.5	8.0	83.9	8.0	0.0	0.0	0.0	3.00	<b>3.88</b>	<b>1.29</b>
CMEN 513*	Transport Phenomena	6	70	11.7	21.4	34.3	27.1	4.3	5.7	7.1	2.66	<b>3.90</b>	<b>1.46</b>
ENGR 222	Thermodynamics	2	50	25.0	0.0	6.0	36.0	2.0	8.0	46.0	1.77	<b>3.78</b>	<b>2.13</b>
MEEN 332	Thermodynamics II	6	270	45.0	2.6	5.2	20.4	13.0	10.0	48.9	1.56	<b>3.79</b>	<b>2.43</b>
MEEN 353	Heat Transfer	5	201	40.2	3.5	9.0	26.4	19.4	12.4	29.4	1.60	<b>3.80</b>	<b>2.38</b>
MEEN 451	Thermal Systems Design	7	274	39.1	4.7	16.4	24.8	27.0	9.9	17.2	1.75	<b>3.69</b>	<b>2.11</b>
total		59	1920	32.5	4.9	17.5	26.6	12.2	6.9	31.8	2.02	<b>3.81</b>	<b>1.89</b>

\*This graduate course is cross-listed as MEEN 543: Advanced Heat Transfer, CMEN 450C/MEEN 450C: Advanced Transport Phenomena.

<sup>1</sup> Butcher, K.F., McEwan, P.J., and Weerapana, A. "The Effects of an Anti-Grade-Inflation Policy at Wellesley College". *Journal of Economic Perspectives*, 28(3), 189-204 (2014)  
<sup>2</sup> Greenwald, A.G., and Gillmore, G.M. "Grading Leniency is a Removable Contaminant of Student Ratings". *American Psychologist*, 52(11), 1209-1217 (1997)  
<sup>3</sup> Redding, R.E. "Students' Evaluations of Teaching Fuel Grade Inflation". *American Psychologist*, 53(11), 1227-1228 (1998)  
<sup>4</sup> Pressman, S. "The Economics of Grade Inflation". *Challenge*, 50(5), 93-102, (2007)

number of students (1920) in a variety of class types (both lecture and laboratory, both undergraduate- and graduate-level, and from 200-level through 500-level) and a variety of class sizes (from small laboratory and graduate classes to larger lecture courses of 65+ students) and have received an average overall rating of 3.81 from the students in anonymous evaluations.

One metric that provides further context for instructor evaluation scores is the ratio of the overall instructor rating for a course to the average grade point awarded in the class. The value of this ratio for my courses over the past six years is provided in the last column in the table above and is plotted here. For example, if an instructor received a perfect rating from students on a 4-point scale but awarded a grade of A to every student in the class, then his/her ratio for that class would be unity. A high value of this ratio is an indicator of quality instruction without grade inflation. I am pleased that the value of this ratio is above 1.0 for all of my classes and is even above 2.0 in some classes. The only classes with a ratio value less than 1.5 are laboratory courses and graduate courses where institutional grading scales tend to be more lenient.



## AWARDS

My efforts and accomplishments in teaching have been recognized at the program, college, and university level. Below is a list of teaching awards I have received since arriving at Louisiana Tech.

- **F. Jay Taylor Undergraduate Teaching Award** (2013) - awarded to one faculty member from the entire University
- **COES Outstanding Faculty Award** (5 times: 2012, 2013, 2015, 2016, and 2019) - given to two or three faculty members in the College of Engineering and Science annually
- **COES Teaching Award** (2010) - given by the COES Dean to two faculty members
- **Golden Shaft Award** (7 times: 2009, 2011-2015, 2018) - voted on by graduating seniors in mechanical engineering and given to the professor maintaining the highest standards

## FURTHER ACTIVITIES TO BENEFIT STUDENTS

### **ChemE Camp**

The transition from the first year to the sophomore year can be fairly challenging for new chemical engineering students. The sophomore year is when most students begin taking core chemical engineering courses whereas the first year primarily focuses on fundamental courses like mathematics, physics, and chemistry. The Material and Energy Balances (MEB) course encountered in the fall of the sophomore year involves a significant increase in rigor relative to typical first year courses, but the course is taken when social support for the students is weakest because they are just being introduced to their chemical engineering classmates and faculty. Significant attrition from chemical engineering programs is a well-documented phenomenon<sup>[5,6]</sup>, and much of it occurs when students encounter the

<sup>5</sup> Culberson, O.L. "Attrition of ChE Undergrads," Chem. Eng. Ed., 4(1), 24-27 (1970)

MEB course. Performance in such barrier courses often determines whether a student persists in engineering <sup>[7,8]</sup>. A large percentage of students earn a grade of D, F, or W in this MEB course at Louisiana Tech (CMEN 202 in the table above), and this is comparable to other peer institutions.

In response, I have worked with Dr. Eric Sherer to develop and administer a two-day voluntary workshop ("ChemE Camp") for rising sophomores, held just prior to the start of classes in the fall. The camp includes the following activities:

- team-building exercises at the challenge course on campus
- presentations about the curriculum
- Q & A session with upperclassman student panel
- internship search & interview tips from Career Center
- talks from upperclassmen about their internship experiences
- lab tour
- faculty introductions
- hands-on heat transfer project
- time management & study skill tips
- informal sports with faculty



Images from student activities during the ChemE Camp: students at the challenge course, students receive a tour of the Unit Ops lab, students during a Q&A session with a panel of upperclassmen.

The camp has received an overwhelmingly positive response from students, and preliminary data from our first three years offering the camp (based on survey responses and academic records) indicate that students who attend the camp felt more comfortable going into their sophomore classes and more comfortable interacting with faculty than non-attendees, and performed better in the MEB course (higher grades and lower D/F/W rate) than non-campers <sup>[9]</sup>. The number of students opting to attend has increased each year (from 15% to 20% to 31% of incoming sophomores). We have applied for federal funding to expand the scope of this project to study the influence of self-efficacy and social support on persistence and achievement in chemical engineering sophomores, and to determine the effect that the camp has on these constructs.

### ChemE Lab Videos

The chemical engineering curriculum involves two separate intensive laboratory courses where students operate large-scale equipment like distillation columns, heat exchangers, and evaporators in order to collect and analyze data. In these courses, students rotate to a different piece of equipment each week in order to run their experiments. When I taught these courses, one of my responsibilities was to make sure that each student team was familiar with the equipment that they were going to be using the following week. This included making sure the students knew the potential safety hazards associated with the experiment, where the different instrumentation (pressure gauges, flow meters,

<sup>6</sup> Felder, R.M., Forrest, K.D., Baker-Ward, L., Dietz, E.J., and Mohr, P.H. "A Longitudinal Study of Engineering Student Performance and Retention. I. Success and Failure in the Introductory Course." *J. Eng. Educ.* **82**(1), 15-21 (1993)

<sup>7</sup> Suresh, R. "The Relationship Between Barrier Courses and Persistence in Engineering." *J. College Student Retention.* **8**(2), 215-239 (2006)

<sup>8</sup> Gainen, J. "Barriers to Success in Quantitative Gatekeeper Courses," *New Directions for Teaching and Learning.* **61**, 5-14 (1995)

<sup>9</sup> Ciccirelli, B.A., Sherer, E.A., Melvin, A.T., "ChemE Camp: A Two-Day Workshop to Increase Student Preparedness for Chemical Engineering Curricula." *Chem. Eng. Ed.*, **52**(3): 181-191 (2018)



etc.) was located, and what data they were to collect. When I first taught the course, I was delivering this information to each group via a personal walkthrough on their next experiment after they finished the current week's experiment. This was time-consuming and inefficient, because I was repeating the same information every week and the students would need to either remember everything I was saying or quickly jot it all down, often while noisy experiments were still going on around them. I decided to instead film these walkthroughs outside of class and make these videos available to students online to view at their own convenience and re-watch as needed to prepare for their upcoming experiments. This idea has been popular with the students, and even led to a peer-reviewed journal publication<sup>[10]</sup>. Every chemical engineering student taking these lab courses since Fall 2010 (over 300 students) has used these pre-recorded video demonstrations to prepare for upcoming experiments.

Over time some of the videos have become outdated as we replace some of the equipment or change instrumentation. Additionally, all of the videos featured me as the sole speaker. So, this past fall I worked with the current lab instructor to film some new lab videos which feature the current equipment and a diverse group of student speakers. We had senior students serve as the experts explaining how to use the equipment and conduct the experiment. Now future students will see peers of different genders and races discuss the experiments they are about to perform. I have additionally added captioning to the videos to improve accessibility for any hearing-impaired students.



Screenshots from updated lab videos featuring a diverse group of students.

### IMPORTANCE OF TEACHING, RESEARCH, AND SERVICE TO THE OVERALL MISSION OF LOUISIANA TECH

I believe that a real commitment to quality undergraduate teaching is one of the things that sets Louisiana Tech apart from its peer institutions. Every university will tell prospective students that they share this commitment, but then many will send these students to classes meeting in crowded lecture halls with hundreds of students, and some will have core courses taught by graduate students. Direct student access to the faculty at some of these institutions is extremely limited. I think that most of our students do not fully appreciate the access to faculty that they enjoy here. I take office hours very seriously and make sure to be available for at least 10 hours a week. Students regularly tell me that they appreciate my accessibility. Going to the whiteboard in my office and helping students work through a homework problem they are struggling with is one of the more rewarding parts of my job.

One of the goals of the university is to prepare its graduates to succeed in the work force. The large number of companies that attend our Career Fair to recruit our students suggests that we are achieving this goal. Employers have found that we prepare our graduates with industry-specific knowledge and skills needed in their fields, and also communication and critical-thinking skills that serve them well

<sup>10</sup> Ciccirelli, B.A. "Use of Pre-Recorded Video Demonstrations in Laboratory Courses." *Chemical Engineering Education*, 47(2), 133-136 (2013)

generally. I regularly hear from graduates working in industry and students returning to campus after a summer internship who tell me how they were able to use the knowledge they gained in my classes in these various job experiences.

While research is not a major focus of my job as a Lecturer, I am involved in engineering education research (such as the ChemE Camp studying I am leading) trying to advance current pedagogical theory as well as improve instruction and learning here on campus.

The presence of a university in a community should provide benefits to its residents beyond just the jobs it supplies. Service projects, like the Big Event held each spring at Louisiana Tech, help benefit local citizens and have participation from many of the student groups on campus. As faculty advisor for both the student chapter of the American Institute of Chemical Engineers (AIChE) and the Omega Chi Epsilon ( $\Omega$ XE) chemical engineering honor society, I have had the opportunity to be a part of these events with students and have enjoyed giving back to the community. Serving others in need gives all of us volunteers a sense of perspective that can be easy to lose otherwise.

#### SELECTED PUBLICATIONS, PRESENTATIONS, AND GRANTS

NSF (PFE:REIF) - "Research Initiation: Influence of Self-Efficacy and Social Support on Persistence and Achievement in Chemical Engineering Sophomores" PI: Ciccirelli, B.A. CO-PIs: Sherer, E.A., Orr, M.K. requested \$178,745 over 2 years (Submitted February 2019)

Ciccirelli, B.A., Sherer, E.A., and Melvin, A.T. "ChemE Camp: A Two-Day Workshop to Increase Student Preparedness for Chemical Engineering Curricula." *Chemical Engineering Education* 52(3), 181-191 (2018)

Ciccirelli, B.A. "Use of Pre-Recorded Video Demonstrations in Laboratory Courses." *Chemical Engineering Education*, 47(2), 133-136 (2013)

Carpenter, J.P., Ciccirelli, B.A., Evans, K.A., O'Neal, D.P., Weiss, L.W. "Louisiana Tech's Model for Running a GCSP at Minimal Cost." NAE Grand Challenge Scholars Program National Workshop, Austin, TX, July 20-21, 2011

#### SERVICE

I have served as the faculty advisor for AIChE and  $\Omega$ XE since 2010. I meet with AIChE officers regularly to plan upcoming meetings and events, such as social activities and community service projects. We have done local park cleanups and performed yardwork for elderly citizens in Ruston, and most recently have helped with debris cleanup after the recent tornado. The  $\Omega$ XE group also performs community service, such as putting up new fencing and dugout materials at the RPAR baseball fields. I also captain an intramural softball team made up of engineering students and faculty and enjoy interacting with students in an informal setting.



The COES Badgers softball team



AIChE and  $\Omega$ XE student groups performing community service.