List of Courses Taught and Overall Teacher Evaluation Rating for Each Course

Term	COURSE NUMBERS	BRIEF COURSE TITLES	CLASS SIZE (9^{th} day)	CLASS SIZE (Final)	Summary Evaluation
W21	CMEN 455	Bioprocess Engineering	13	13	3.9
F20	CMEN 504	Advanced Chemical Engineering Kinetics	3	3	4.0
F20	CMEN 402	Chemical Reaction Engineering	30	29	3.7
W20	CMEN 455	Bioprocess Engineering	11	11	3.9
F19	CMEN 402	Chemical Reaction Engineering	36	36	3.8
S19	CMEN 504	Advanced Chemical Engineering Kinetics	4	4	3.3
W19	CMEN 455	Bioprocess Engineering	6	6	3.8
W19	MSE 557	Bioprocess Engineering	7	6	3.6
F18	CMEN 402	Chemical Reaction Engineering	37	36	3.5.
S18	CMEN 450C	Advanced Chemical Engineering Kinetics	5	5	4.0
S18	CMEN 504	Advanced Chemical Engineering Kinetics	8	8	3.9
W18	CMEN 557	Bioprocess Engineering	2	2	4.0
W18	CMEN 450C	Bioprocess Engineering	25	25	3.7
F17	CMEN 402	Chemical Reaction Engineering	46	46	3.5
S17	CMEN 413	Unit Operations – Design III	30	30	3.3
W17	CMEN 557	Bioprocess Engineering	3	3	4.0
W17	CMEN 450C	Bioprocess Engineering	11	11	3.9
F16	CMEN 402	Chemical Reaction Engineering	39	39	3.6
F16	CMEN 504	Advanced Chemical Reaction Kinetics	3	3	4.0
		Average			**3.8**

The Importance of Teaching and Innovations Introduced: For the next generation of students to excel in the workplace, concepts essential to their area must be transferred. In addition, in our rapidly changing world, they must be taught to devise creative new solutions to new challenges. Obviously, the millennial generation of students learns better if innovative techniques replace those used in the past. Each time I teach a course I modify and change the materials and structure to improve their quality and ability to stimulate thought and initiative among students. Ever since I read the book “Brain Rules” by John Medina, I have tried to change activities in the classroom every 15 minutes so that the students can re-focus on the materials taught.

One way to break up the lecture portion into student attention span blocks is to display a question or next step of a problem on the board. Students then work on the problem in groups of two or three. This method encourages them to engage with the material. After 3 minutes, I then hand a student dice to roll in a dice tower. The die or dice rolled depends on the class size. By rolling the dice, a student is randomly chosen. (If a number is rolled that does not correspond to a student, the question is answered by a volunteer). Since students know they may be called on, they feel motivated to figure out the answer and have time to think before having to answer. This technique avoids the “deer in the headlights” look some students have when they are suddenly asked a question in class.

Another learning technique I use is singing. For each course I have taught, I have put at least one important equation to music and sung it to the class (or with the class pre-COVID). I believe this different way of reinforcing knowledge helped students who are aural learners. It also provides a switching of gears to re-focus students.

Quizzes in my courses have varied from interactive computer games to online quizzes to written quizzes. I have also developed and had a few trial runs of a prototype oral quiz given one-on-one. By role-playing a non-engineering manager and a plant operator, I have given students an opportunity to practice explaining concepts to non-engineers. I plan to continue developing this oral quiz concept. Some student responses to the oral quiz they took were: "I feel pretty comfortable with this" to "It felt very relevant to my studies as well as real life situations."

For many of the homework problems in my courses, I assign an individual student to present the problem by a slide in class the day it is due. I preview the slide to make sure the solution is correct before the student presents it. Students thus receive immediate feedback on problems they have worked on the day before. If they have not gotten the problem correct, they then can solidify the proper method in their mind, rather than assuming the way they did it was right. By doing the problem (after the method has been introduced in lecture), and then teaching other students how to do it, a student can understand the underlying concept more deeply.

I have also given students project challenges that encourage them to think globally. They must choose to site an industrial reactor in one city not in North America. After they have performed a literature search, they must turn in an outline to ensure that they are progressing on the project. Finally, they present slides explaining the challenge and their take on socially, culturally, and environmentally appropriate solutions.

The response to my using a variety of instructional methods can be seen in the student evaluation comments below:

Student Comments when Evaluating my Courses:
“I loved having Dr. Lynam as my professor. She is a great teacher who deeply cares that her students understand the material she presents.”
“Excellent teacher and she shows a passion for what she is doing. I enjoyed and learned a lot everyday in class. Especially from her challenging problems.”
“The class was awesome, she explained course materials very well and gave us assignments that stimulated our interest in the topic all the more. she also organised field trips that helped us see the practical side of the course.”
“Best course I have taken here at LA Tech and Dr. Lynam is the best professor I have ever had.”
“Dr Lynam's energetic attitude is contagious and cultivates an active learning environment.”
“Dr.Lynam did an excellent job keeping students, both in-person and online, engaged and learning. I really enjoyed this course!”

"This was a really interesting class! Dr. Lynam did a great job of maintaining student interest, and it is evident that she truly cares about students learning the material."
"The quizzes were extremely helpful in solidifying concepts learned in class"
"Homework presentations help increase understanding, I think it is important to go over homework problems in class."
"Homework was well-chosen (good amount, relevant)."
"The homework was very helpful in getting out of class practice and learning about the subjects that we were learning in class."
"Singing the formulas, it was catchy and helped me remember during the exam."

Activities in which the Nominee has Engaged to Benefit the University Community: I have unofficially advised and mentored 30 undergraduates in my Biomass Team, some of whom were in Biomedical Engineering or Mechanical Engineering. All of these students were motivated to find solutions to challenges in converting wastes from food production to bioproducts. These Biomass Team members have enjoyed the collegial environment of their shared research, which has encouraged their retention at LA Tech. Because of their creative work, several of the undergraduates have become co-authors on journal articles that were published in peer-reviewed publications. One particularly interesting project allowed two undergraduates to travel with me to MIT to use some advanced instruments, all at MIT's expense. The project investigated rice husk ash addition to cement and the results showed greater compression strength. These undergraduates co-wrote a journal article, which was published in the highly regarded journal *ACS Sustainable Chemistry and Engineering.* In addition, I have published journal articles with five other undergraduates. For my Biomass Team unofficial advisees, I write letters of recommendation to assist them in obtaining internships or jobs.

Performance Evaluations of the Nominee (Daniela Mainardi, Director of CMEN): "As the supervisor of Dr. Lynam, I have found her to be very dedicated to serving our department, the college, and the University. She has devoted hours of her time to reflecting on and improving her teaching, and has attended the week-long Bootcamp of the American Society for Engineering Education to learn new techniques. She has engaged with the community in presenting demonstrations of biomass waste to products to many high school students and elementary school students. She has influenced the research community in publishing a record number of highly-cited peer-reviewed journal articles since she has come to LA Tech in 2016. She has collaborated in successful projects with colleagues in the Mechanical Engineering department and the Civil Engineering department at LA Tech. As an assistant professor devoted to LA Tech's enhancement and excellence, Dr. Lynam is an appropriate recipient for the Virgil Orr award."

The Importance of Research: Research is discovering new concepts and materials that can be used for the benefit of humanity. While "standing upon the shoulders of giants (*Newton*)," researchers transformatively think or experiment in ways that have never been done before. At LA Tech, I have struggled to find new ways to create treasure from landfilled trash so improve the sustainability of food production. Each student in my Biomass Team has caught the vision of improving our world by engaging in research to discover new solutions to today's challenges.

Publications in peer-reviewed journals since beginning at Louisiana Tech in September 2016: **(15 journal articles, 218 citations)**

Narendra Kumar, Sudhir S. Amritphale, John C. Matthews, Joan G. Lynam*, Shaurav Alam, Omar Abdulkareem, *Synergistic utilization of diverse industrial wastes for reutilization*, Waste Management 2021, Volume **126**, p. 728-736, https://doi.org/10.1016/j.wasman.2021.04.008.

Ekugbere O. Owhe, Narendra Kumar, Joan G. Lynam, *Lignin Extraction from Waste Biomass with Deep Eutectic Solvents: Molecular Weight and Heating Value*, Biocatalysis and Agricultural Biotechnology 2021, 32, https://doi.org/10.1016/j.bcab.2021.101949.

Sajjad Khudhur Abbas Al-Amshawee, Mohd Yusri Bin Mohd Yunus, Joan G. Lynam, *Non-catalytic ozonation of palm oil mill effluent (POME)*, Chemical Engineering Research and Design 2021, Volume **167**, p. 169-182, https://doi.org/10.1016/j.cherd.2021.01.012

Sajjad Al-Amshawee, Mohd Yusri Mohd Yunus, Joan G. Lynam, Woo Hyoung Lee, Fei DaiIhsan Dakhil, *Roughness and Wettability of Biofilm Carriers: A Systematic Review*, Environmental Technology & Innovation 2021, 21, https://doi.org/ 10.1016/j.eti.2020.101233. Citations: 2

Ashique Akond, Joan G. Lynam*, *Deep eutectic solvent extracted lignin from waste biomass: Effects as a plasticizer in cement paste*, Case Studies in Construction Materials 2020, Volume **13**, https://doi.org/ 10.1016/j.cscm.2020.e00460. Citations: 1

Sajjad Al-Amshawee, Mohd Yusri Bin Mohd Yunus, Rosli Bin Mohd Yunus, Joan G. Lynam, *Zero waste system comprised of fixed bed biofilm reactor, ozone oxidation, and electrodialysis desalination for wastewater sustainability*, Journal of Water Process Engineering 2020, Volume **38**, 101593, https://doi.org/10.1016/j.jwpe.2020.101593. Citations: 2

Ramu Gautam; Narendra Kumar; Joan G. Lynam*, *Theoretical and Experimental Study of Choline Chloride-Carboxylic Acid Deep Eutectic Solvents and their Hydrogen Bonds*, Journal of Molecular Structure 2020, Volume **1222**, https://doi.org/10.1016/j.molstruc.2020.128849. Citations: 2

Narendra Kumar, Ramu Gautam, Justin D. Stallings, Gary G. Coty, IV, Joan G. Lynam*. *Secondary Agriculture Residues Pretreatment Using Deep Eutectic Solvents.* Waste Biomass Valorization 2020, Volume **12**(5), Pages 2259-2269. https://doi.org/10.1007/s12649-020-01176-1. Citations: 3

Travis D. Garrett, Henry S. Cardenas, **Joan G. Lynam*,** *Sugarcane Bagasse and Rice Husk Ash Pozzolans: Cement Strength and Corrosion Effects When Using Saltwater*, Current Research in Green and Sustainable Chemistry 2020, Volumes **1–2**, p. 7-13, https://doi.org/10.1016/j.crgsc.2020.04.003. Citations: 4

Cameron Henry; **Joan G. Lynam***, *Embodied Energy of Rice Husk Ash Production to Replace Portland Cement*, Case studies in Chemical and Environmental Engineering 2020, Volume **2**, https://doi.org/10.1016/j.cscee.2020.100004. Citations: 4

Narendra Kumar, Pranjali D Muley, Dorin Boldor, Gary Coty IV, and **Joan G Lynam***, *Pretreatment of Waste Biomass in Deep Eutectic Solvent: Conductive Heating versus Microwave Heating*, Industrial Crops and Products 2019, Volume **142,** https://doi.org/ 10.1016/j.indcrop.2019.111865. Citations: 19

Md. Shams Arafat; Nazimuddin M. Wasiuddin; Narendra Kumar; Ekugbere O. Owhe; **Joan G. Lynam***, *Use of Sustainable Lignin to Enhance Asphalt Binder and Mix Properties*, Journal of Cleaner Production 2019, Volume **217**, p. 456-468. Citations: 25

Narendra Kumar; Kunal Kupwade-Patil; Rayna Higuchi; David P. Ferrell; Vanya A. Luttrull; and **Joan G. Lynam***, *Use of Biomass Ash for Development of Engineered Cementitious Binders*, ACS Sustainable Chemistry and Engineering 2018, Volume **6** (10): p. 13122- 13130. https://doi.org/10.1021/acssuschemeng.8b02657. Citations: 12

Akbar Saba; Brandon Lopez; **Joan G Lynam**; and M. Toufiq Reza*, *Hydrothermal Liquefaction of Loblolly Pine: Effects of Various Wastes on Produced Biocrude*, ACS Omega 2018, Volume **4** (3): p. 3051-3059. Citations: 13

Joan G Lynam*; Narendra Kumar; Mark J. Wong, *Deep eutectic solvents' ability to solubilize lignin, cellulose, and hemicellulose; thermal stability; and density*, Bioresource Technology 2017, Volume **238**: 684-689. Citations: 143

Previous journal articles before coming to LA Tech: 16 articles. Including all 31 journal articles, 2091 Citations total for an h-index of 19.

Grants since beginning at LA Tech in 2016 (Total Awards of $1,124,555 as a PI and $83,724 as a Co-PI):

Year	Title	PI/Your role	Funding Agency	Total award	Period covered
	Funded Projects				
2021	Research and Engineering Apprenticeship Program (REAP)	Co-PI	USAEOP	$8,000	06/21-08/21
2020	Expanding Value Louisiana's Technical Assistance Capacity to Deliver Source Reduction Assistance	Co-PI	EPA	$53,724	10/20-09/22
2020	Extraction of Metals from Regolith with Deep Eutectic Solvents	PI	NASA	$6,000	09/20-08/21
2020	Direct Contact Membrane Distillation Separation of Urea from Urine for Use as a Superplasticizer in Regolith-based Cement	PI	NASA	$61,281	09/20-08/21
2020	Research and Engineering Apprenticeship Program (REAP)	Co-PI	USAEOP	$8,000	06/20-08/20
2019	Project-based Research Classes for High School Students: Agricultural and Forestry Wastes to Products	PI	USDA	$192,497	09/19-08/22
2019	Research and Engineering Apprenticeship Program (REAP)	Co-PI	USAEOP	$8,000	06/19-08/19
2018	Research and Innovation to support Source Reduction in businesses in Louisiana	PI	EPA	$341,891	10/18-09/20
2018	Sustainable, Sulfur-free Lignin from Waste Biomass as a Cement Plasticizer	PI	NASA	$69,481	09/18-08/19
2017	Sustainable, Sulfur-free Lignin to Replace Plasticizers in Cement	PI	NASA	$6,000	09/17-08/18
2017	Viability of Lignin-based Solid Biofuels as an Environmentally Friendly Propellant in Small Scale Rockets	Co-PI	NASA	$6,000	09/17-08/18
2017	Biomass Ash as Replacement for Portland Cement in Concrete: Porosity, Strength, Corrosion, and Microscopic Phase Analysis	PI	NASA	$68,879	07/17-06/18
2017	Evaluating Using Louisiana-sourced Lignin as Partial Replacement in Asphalt Binder and as an Antioxidant	PI	DOT-LTRC	$30,000	07/17-06/18
2016	Deep Eutectic Solvents for Deconstruction of Rice Hulls and Sugarcane Bagasse	PI	LA-BOR	$264,802	07/17-06/21

Community/Service Activities:
I have given biomass demonstrations to high school students at Ruston High School, Jackson High School, and Sacred Heart High School. I also gave a biomass demonstrations to the 3rd to 5th graders at both the 2018 SciTech camp and Glen View Elementary. I have been a mentor for the 8th grade shadowing program at A.E. Phillips School.