

2024 Virgil Orr Junior Faculty Award Nomination Packet – Josh Vandenbrink

Assistant Professor in the School of Biological Sciences, College of Applied and Natural Sciences

I am honored to be nominated for the Virgil Orr Junior Faculty Award for my work over the past 5 years at Louisiana Tech University. Please find attached my statement on my achievements here at Louisiana Tech University.

Teaching

Teaching stands at the core of the Louisiana Tech's purpose, facilitating the transfer of knowledge, fostering critical thinking, and preparing students for the challenges of the future. It is through teaching that students are not only equipped with the technical skills required in their fields but also with the soft skills such as problem-solving, communication, and ethical reasoning that are essential in today's complex world. Effective teaching ignites curiosity, encourages lifelong learning, and molds individuals who are capable of contributing positively to society. Moreover, the integration of teaching with the latest research findings ensures that the curriculum remains current and relevant, thereby enhancing the quality of education provided. Over duration of my time at Louisiana Tech, I believe that the area of teaching is where I have grown the most professionally.

A common problem facing biology students is what they will do after graduation. For most students majoring in biology, the goal is medical (or dental) school after graduation. However, many students will find part-way through their degree that they might not have the grades or the interest in attending medical school. A lot of these students come to me for advising lost as to what their career choices are. These students often fall through the cracks in the department, and are left graduating without having a career plan in place.

It is my goal as a teacher here at Louisiana Tech to introduce these students to other possible career choices and avenues they can pursue that do not require medical school. This has led me to develop four courses in computational biology, in which students learn how to code in Python and R, and apply their coding knowledge to solving biological problems. Over the course of the last decade, biology has progressively moved towards computational and bioinformatic tools for enhancing scientific knowledge. As such, the computer languages R and Python have become invaluable tools in Biology, whether genomics, molecular sciences or ecology/environmental sciences. Thus, I have created these courses that provide students the requisite knowledge and tools to effectively analyze data utilizing computational methods. This has led to many students pursuing careers in computational biology (or closely related fields like data science and health informatics) at the graduate level.

The computational biology courses have been very successful, with some classes reaching 100+ students. Due to the interest, I am currently working with Tom Bishop (and under the guidance of Bill Campbell and Jamie Newman) to establish an undergraduate certificate in Computational Biology here at Louisiana Tech, and hope to have established the program in the coming year.

This computational biology certificate will leverage innovative technology to give students a one-of-a-kind experience in computational biology. To create an intuitive learning experience for the students, I have partnered with Praxis-AI to create an online platform for learning computational biology. Praxis-AI provides an online platform that allows students to access the programs required for R and Python (RStudio or Jupyter Notebooks, respectively) from a web browser, without requiring the students to download and install software to their personal computer. In addition, this tool allows a more inclusive learning environment, as some students do not have access to their own computer, or own a laptop that is not suitable for data analysis (i.e. a Chromebook). Additionally, the Praxis-AI system provides

computational power required for these analyses, which is often difficult to achieve on a personal computer.

In designing my classes, I am very open to taking students feedback to improve my courses and their learning experiences. In 12 of the 17 courses I have offered during my time here at Louisiana Tech, my student evaluations have met or exceeded the department average. It is my goal to

Results of Student Evaluations

Quarter	Year	Course	Rating*	Department	College	University
Fall	23/24	Bisc 450C	3.9	3.6	3.7	3.7
Fall	23/24	Bisc 450C	4	3.6	3.7	3.7
Spring	22/23	Bisc 380H	3.5	3.5	3.6	3.7
Spring	22/23	Bisc 380H	3.7	3.5	3.6	3.7
Spring	22/23	Bisc 450C	3.5	3.5	3.6	3.6
Spring	22/23	MSNT657	4	3.6	3.6	3.6
Winter	22/23	Bisc 411	3	3.5	3.6	3.6
Fall	22/23	Bisc 450C	4	3.5	3.6	3.6
Spring	21/22	Bisc 450C	3.9	3.6	3.6	3.6
Winter	21/22	Bisc 411	3.8	3.5	3.6	3.6
Winter	21/22	Bisc 511	3.5	3.5	3.6	3.6
Fall	21/22	Bisc 310H	3.3	3.5	3.6	3.6
Spring	20/21	Bisc 355C	4	3.5	3.6	3.6
Winter	20/21	Bisc 411	3.4	3.5	3.6	3.6
Fall	20/21	Bisc 310H	3.4	3.4	3.5	3.6
Spring	19/20	Bisc 422	2.8	3.6	3.5	3.6
Winter	19/20	Bisc 411	3.9	3.6	3.7	3.6
Fall	19/20	Bisc 310 Honors	4	3.6	3.6	3.6
Spring	18/29	Bisc 411	3.4	3.6	3.7	3.6

*Bold ratings highlight quarters in which the evaluation was greater than or equal to department average

Service

During the previous 5 years at Louisiana Tech, I have served a number of graduate student and departmental committees. I recently was part of the academic success committee headed by Dr. Natalee Clay to map the outcomes of students who were struggling in advanced levels classes, and propose ways to address perceived shortcomings in our biology curriculum. Currently, I am heading the Neal, Hayes and Turner scholarship committees for the School of Biological Sciences. In this position, I am tasked with soliciting applications, assembling reviewers and reviewing applications for these scholarships. I have also provided a service to the department through the creation of additional course offerings available to students. I have created four courses teaching bioinformatic tools to students interested in computational biology. In addition, I have been very flexible in adjusting the number of seats available in the courses to allow students flexibility in scheduling.

In addition, I was also the faculty advisor for Omicron Delta Kappa National Leadership Honors Society from 2018-2020. However, due to the Covid-19 Pandemic, the group is no longer active. In terms of graduate responsibilities, I have been active in the graduate program at Louisiana Tech, serving on 10 graduate committees, while also advising 3 graduate students of my own. I have encouraged both my own students, and graduate students whom I am a committee member to participate in ANS day, as well as present their findings at conferences and meetings.

Service to the Profession: In service to the profession, I have participated in the peer review process by performing reviews for numbers journals including (but not limited to) The Journal of Gravitation and Space Research, Scientific Reports, Frontiers in Plant Science, PLOS One, and Plants. In addition, I served on the NASA Analysis Working Group and Steering Committee, which aimed to develop protocols

and standard operating procedures for spaceflight genomics data. In addition, from 2018 to 2019, I served as an associate editor for the Springer journal *Data in Brief*, however, resigned after the birth of our child. Service to the Public: One of my great passions is educating students from underserved and underrepresented communities. As part of this effort, I have made all my lecture materials publicly available via YouTube. To date, my lectures have garnished 130,000-plus views, with thousands of views coming from interested students in such as India, the Philippines, Turkey, Zimbabwe, to name a few. An example of a message received from a student:

“Dear Sir, thank you very much for spending your precious time making these superb bioinformatics courses help poor students like us increase our knowledge. I wish you all the best in your career and your daily life.”

In addition, I am working with our technology partner, Praxis-AI, to make these lecture materials available to underfunded or under resourced universities in the US, such as tribal universities, to help better prepare students for careers in computational biology.

Research

As an Assistant Professor at Louisiana Tech, I have worked hard to establish an internationally recognized research program in Space Biology. Over the course of the last 5 years, I have **published 10 peer-reviewed articles, published 5 abstracts at international conferences**, as well as presented 4 posters at the Annual Meeting of the American Society for Gravitational and Space Research (ASGSR) meetings. In 2020, I was also awarded the prestigious **Thora Halstead Young Investigator Award** from ASGSR. I also received the prestigious NASA Group Achievement Award, which is awarded to “... any combination of Government and/or non-Government individuals for an outstanding group accomplishment that has contributed substantially to NASA’s mission.” This award was for my work on the Seedling Growth series of spaceflight experiments, which my lab continues to publish results. In addition, I am a charter member of NASA’s GeneLab analysis working group, which focuses on utilizing and disseminating genomics data pertaining to spaceflight. All these achievements occurred in spite of COVID-19 pandemic, which severely hampered my research productively for the span of 18 months.

I have submitted grants requesting over \$3,000,000 in funding during my first 5 years at Louisiana Tech. While I have scored well and had some competitive applications, I have yet to receive substantial funding in plant space biology. This is largely due to the entrenched nature of senior researchers in the field, as well as limited available resources that NASA can provide in the field. Therefore, I have recently started a second area of research in my lab, focusing on edible mushroom cultivation in regard to spaceflight. This area of research, I feel, provides me a competitive advantage in future grant solicitations as it is an extremely under researched area of space biology. In addition, I am collaborating with Dr. Karl Hasenstein from the University of Louisiana Lafayette on this project. Dr. Hasenstein has had numerous spaceflight projects, and has received millions of dollars in NASA funding. The new project in conjunction with the new area of research should lead to increased funding for the lab in the future.

I have great passion for providing research experience to undergraduate students in my lab. Over the course of my time at Louisiana Tech, **I have mentored 25 students** in conducting space biology research in my lab. Students have learned research design methods, sterile technique, plant husbandry, data and image analysis, among many other skills pertaining to biology research. In addition, students have been encouraged to work on their oral and written scientific communication skills. Three undergraduate students received LaSpace Undergraduate Research Assistantships for their projects.

Lastly, I have aimed to provide service to the department through collaborative research efforts with fellow faculty in the department. I am currently working (or have submitted grants) on collaborative

research with Dr. Rebecca Giorno, Dr. Michael Wells, Dr. Jennifer Hill and Dr. Jamie Newman within the department.

Publications

- Hasenstein, Karl H, John, Susan P, and **Vandenbrink, Joshua P.** (In press). Assessing radish health during space cultivation by gene transcription. *Plants*
- Hughes, AM, **Vandenbrink, JP**, Kiss, JZ. (2023) Efficacy of the Random Positioning Machine as a terrestrial analogue to microgravity in studies of seedling phototropism. *Microgravity Science and Technology*. 35:43 (2023)
- Shymanovich, T., **Vandenbrink, JP**, Herranz, R., Medina, FJ., Kiss, JZ. (2022) Spaceflight studies identify a gene encoding an intermediate filament involved in tropism pathways. *Plant Physiology and Biochemistry*. 171, 191-200.
- Overbey, E. G., Saravia-Butler, A. M., Zhang, Z., Rathi, K. S., Fogle, H., da Silveira, W. A., ... & Galazka, J. M. (2021). NASA GeneLab RNA-seq consensus pipeline: standardized processing of short-read RNA-seq data. *Iscience*, 24(4).
- Villacampa, A., Ciska, M., Manzano, A., **Vandenbrink, J. P.**, Kiss, J. Z., Herranz, R., & Medina, F. J. (2021). From Spaceflight to Mars g-Levels: Adaptive Response of *A. thaliana* Seedlings in a Reduced Gravity Environment Is Enhanced by Red-Light Photostimulation. *International Journal of Molecular Sciences*, 22(2), 899.
- Overbey, E. G., Saravia-Butler, A. M., Zhang, Z., Rathi, K. S., Fogle, H., da Silveira, W. A.,... **Vandenbrink, J.P.**, ... & Galazka, J. M. (2020). NASA GeneLab RNA-Seq Consensus Pipeline: Standardized Processing of Short-Read RNA-Seq Data. *bioRxiv*.
- Vandenbrink, J. P.**, & Kiss, J. Z. (2020). Spaceflight Procedures and Operations Utilized During the Seedling Growth Experiments. *Gravitational and Space Research*, 4(2), 38-46.
- Herranz, R., **Vandenbrink, J.P.**, Villacampa, A., Manzano, A., Poehlman, W., Feltus, F.A., Kiss, J.Z., and Medina, F.J. (2019) RNAseq analysis of the response of *Arabidopsis thaliana* to fractional gravity under blue-light stimulation during spaceflight. *Frontiers in Plant Science*. 1529 – 1540.
- Vandenbrink, J.P.**, Herranz, R., Poehlman, W.L., Feltus, F.A., Villacampa, M.C., Medina, F.J. and Kiss, J.Z. (2019) RNA-seq analyses of *Arabidopsis thaliana* seedlings after exposure to blue-light phototropic stimuli in microgravity. *Am J Bot* 106: 1466-1476.
- Vandenbrink, J.P.** and Kiss, J.Z. (2019) Preparation of a Spaceflight Experiment to Study Tropisms in *Arabidopsis* Seedlings on the International Space Station. *Meth Mol Biol* 1924: 207-214.

Honors and Awards

2021 – Nominated for College of Agriculture and Natural Science Research Award.

2020 - American Society of Gravitational and Space Research Thora Halsted Young Investigator Award - This award was established in 1994 to honor a young scientist who exemplifies Thora's drive and enthusiasm for science, and who has made significant contributions to the field of gravitational and space research.

2019 - Nasa Group Achievement Award – Seedling Growth Team. Awarded for outstanding contribution enabling exploration, collaborating with ESA to completing a series of three plant biology payloads on the International Space Station.

Student Evaluation Comments

“Professor Vandenbrink is young, dynamic, and very talented. He has brought the course materials to life by his video lectures that I learn well. I also appreciate his concerns for how well students can perform on the exams and do well on class assignments. I enjoyed his class this Winter quarter the most of all!”

“A fantastic professor! Incredible and interesting class.”

“You are one of the best profs at LA Tech. Congrats on the addition to your family. Hoping to have a chance to take you again.”

“... Not the mention how helpful Dr. VDB was when I struggled at one point in the class. We zoomed and he was very helpful, unlike some of my other professors in online classes!”

The instructor was very responsible and clear with his lectures. He made sure we knew what was going on each week via the planner he made for us. For an online class, it was easy to follow with him. I love how he added himself onto the lectures so we're not just listening to a random voice. He gave us quizzes which guided us for our exams. I really enjoyed his class and what it turned out to be. If anything, it was hard studying for several chapters for only one exam, but like I said his organization for the class made it better to follow.

“After taking this class, I definitely feel like I learned a lot about developmental biology, and now I am pretty interested in it.”

“Probably one of, if not the best professor I've had in my 3 years at Tech. He does a wonderful job of communicating with his students despite the current circumstances we are living in. He presents his lectures in a manner that is easy to understand and provides MANY examples to aid learning. He is very understanding and has a personality that makes focusing on lectures easy and enjoyable. Looking forward to potentially taking more classes with Dr. Vandenbrink.”

“I love the fact that Vandenbrink posts his lectures to YouTube so that it is free to look at during any point in time during the class or outside to refer back to it. This to me is helpful in studying for a professional school entrance exam review.”

“I loved Dr. Vandenbrink’s class. While I quickly discovered that genetics was not a strong suit of mine, Dr. Vandenbrink always helped in Zoom sessions, and helped me to understand what I could not seem to get. He also makes an effort to try and see things from the perspective of a student, which I cannot say the same for most professors.”

“excellent class - really enjoyable, rigorous and educational, not trying to trick anyone”

“Dr. Vandenbrink is the most approachable and caring professor I've had while taking 110+ hours at Louisiana Tech University in mostly biology/chemistry classes. He really makes a point to ask him about things he doesn't understand and his reverse class room videos are very thorough. I would recommend him to anyone, and I think he is a great asset to our biology department. I hope he stays here until he retires.”

“Great teaching style and helps you understand concepts by breaking the information down. He helps you comprehend the material. Quizzes are great.”