



Proposal for a New Academic Program

Institution: University of Oregon

College/School: School of Music and Dance

Department/Program Name: Department of Music

Degree and Program Title: Phd in Data-driven Music Performance and Composition

1. Program Description

a. Proposed Classification of Instructional Programs (CIP) number.

50.0913

b. Brief overview (1-2 paragraphs) of the proposed program, including its disciplinary foundations and connections; program objectives; programmatic focus; degree, certificate, minor, and concentrations offered.

As a response to the undeniable rise in the importance of data, we propose an advanced degree program in music that in no way recedes from music and music-making, but that centrally relates data to music, intermedia composition, digital audio creation, sound creation, and data sonification. Within music, attention directed towards data is manifest most notably in the ways musical sounds are actuated and controlled in real-time performance situations. Instead of exerting energy into a physical body, like striking a drum or plucking a violin string, musical sounds are actuated and controlled by data input to algorithms. Because of exponential increases in computing speeds during the past 20 years, electronic music has evolved from a discipline where the actuation and control of musical sound was almost exclusively non-realtime and compositionally-centered, to a discipline that is substantially, but not exclusively, realtime and performative.

Coursework in the proposed degree program that specifically addresses and acknowledges this paradigm shift includes data-driven instrumental performance, musical performance networks, data-based instrument design and fabrication, and data sonification. The dissertation will be a creative and analytical product consisting of a text document and an original real-time electroacoustic composition for data-driven instrument(s). Because there is no widely accepted notational method for computer music, the composition will be represented as a high-definition audio/video recording of a performance of the dissertation work that will be submitted as supplemental material. The knowledge cultivated in this proposed course of study will position those who complete the degree well for successfully competing for both professional, research and academic positions. This proposed degree also relates to the proposed Master's degree in Data Science Specialization and functions as a counterpoint to it by offering coursework, not in data visualization, but in data sonification

and auditory display. Because data sonification and its auditory display relates to the mapping of data produced through research, experiment, or observation, to parameters contained in sound-producing algorithms for the purpose of articulating features in the data, we imagine a degree recipient could find their ways into both academic and industry research positions.

The motivation for advancing this proposal relates to our concern for evolving our curricular studies to best address the rapidly expanding discipline of music technology. The degree program described in this proposal represents an evolution from a currently operational DMA degree that concentrates on the performance of data-driven musical instruments to a degree program that balances performance with research. The diversification of scholarly and creative work resulting from an increase of FTE in the music technology area offers the opportunity to broaden its curricular studies. The breadth of study rebalances the degree program by enhancing profiles in data-driven composition, data sonification, artist/brand development, aesthetics and design, and cultural discourse. These changes shift the degree program from being less about musical performance to being more about academic inquiry and discourse and reflect the difference in the degree name – DMA to PhD.

c. Course of study – proposed curriculum, including course numbers, titles, and credit hours.

Code	Title	Credits
General Degree Requirements		27-30
<u>MUS 611</u>	Research Methods in Music	3
<u>MUS 665</u>	Music in the 20th Century	3
	Artist/Brand Development Course	4
	Aesthetics and Design Course	4
	Elective Courses	9-12
Area Requirements		
<u>MUE 639</u>	Pedagogy and Practicum: [Topic]	3
<u>MUS 693</u>	Oregon Electronic Device Orchestra	2
<u>MUP 765</u>	Music Performance Studies: [Topic]	24
<u>MUS 550</u>	Sensor Music	3
<u>MUS 570</u>	History of Electroacoustic Music	3
<u>MUS 571</u>	Musical Performance Networks	3
<u>MUS 579</u>	Data Sonification	4
	Dissertation	18
Total		87-90
Credits		

General Degree Requirements – 27-30 credits:

MUS 611 Research Methods in Music (3 cr.) MUS 665 Twentieth Century Music (3 cr.)

Artist/Brand Development Course (selected from evolving menu of courses, 4 cr.)*

Aesthetics and Design Course (selected from evolving menu of courses, 4 cr.)*

Cultural Discourse Course (selected from evolving menu of courses, 4 cr.)*

Elective Courses (9-12 cr.)

Area Requirements – 42 credits

MUE 639 Pedagogy and Practicum for Data-driven Instruments (3 cr.) MUS 693 Oregon Electronic Device Orchestra (2 cr.)

MUP 769 Data-driven Instrument Performance (24 cr., 4 cr. x 6 terms) MUS 550 SensorMusik (3 cr.)

MUS 570 History of Electroacoustic Music (3 cr.) MUS 571 Musical Performance Networks (3 cr.) MUS 579 Data Sonification (4 cr.)

Other – 0 credits:

Solo Recital and Portfolio Requirement (0 cr.)

Recital requirement – 0 credits

The solo recital requirement will be fulfilled by the presentation on the University of Oregon campus of a solo recital containing five original electroacoustic compositions to be performed with data-driven instruments that employ a variety of interface devices as the front-end to the data-driven instrument. Expected total duration will be approximately one hour.

Portfolio Requirement – 0 credits

The six works included in the digital video portfolio must be musically substantial and well-executed compositions. All of the compositions of the portfolio must have received a public performance. Only one of the portfolio compositions may include other musical performers. The videos of the six works should be created as studio productions and not produced from recordings of live performances (except in rare cases when audience impact is vital to the work itself). The quality of the final audio/video product must be excellent.

Comprehensive Exams – 0 credits

There will be a comprehensive exam that concentrates on musical and technical areas of music technology.

Dissertation, MUS 603 – 18 credits:

The dissertation will be comprised of 1) an original large-scale computer music composition of a substantial and ambitious scope that is at least fifteen minutes in duration, that is performed with a data-driven instrument, and that is documented with a high-definition audio video recording; 2) the original software that contributes to documentation of the composition and that forms an essential component to the data-driven instrument; and 3) a text document that analyzes and describes the composition and the data-driven instrument.

d. Manner in which the program will be delivered, including program location (if offered outside of the main campus), course scheduling, and the use of technology (for both on-campus and off-campus delivery).

On Eugene main campus.

e. Adequacy and quality of faculty delivering the program.

The core music technology faculty (Bellona, Hatakeyama, and Stolet) form an elite, world-class group. All have had their original musical work and scholarship presented around the world at the most prestigious conferences and festivals for computer and electronic music. Among these events are the International Computer Music Conference, the Society for Electro-Acoustic Music in the United States National Conference, the International Conference for New Interfaces for Musical Expression, the Musicacoustica Festival (Beijing), the New York City Electroacoustic Music Festival, and the Kyma International Sound Symposium.

Among the notable accomplishments of the music technology faculty are presentations at the Smithsonian Institute (Washington, D.C.), the Museum of Modern Art (New York), and the Pompidou Center (Paris). Additionally, Bellona is a Co-Principal Investigator on a recent National Science Foundation award titled “Accessible Oceans: Exploring Ocean Data through Sound.” The project uses data sonification “to convey meaningful aspects of ocean science” and “to advance knowledge on the design of auditory displays for all learners, with and without disabilities.” I also note that Hatakeyama was voted as the Best Musical Performer at the International Conference for New Interfaces for Musical Expression and has had her music selected through juried review to appear on the Society for Electro-Acoustic Music in the United States compact disc series. Finally, Stolet has published two impactful books on computer music and has been inducted into China's prestigious DeTao Masters Academy which brings “eminent professionals and experts to China, where they share the tacit knowledge that brought them to world leadership in their fields with high-level Chinese colleagues.” Acknowledgement of Stolet's work in China is extensive and broad as he holds honorary professorships at three important music conservatories and has received a lifetime achievement award in China for his contributions to interactive computer music.

Beyond an excellent record in creative and research scholarship, the core faculty is deeply committed to excellence in teaching.

f. Adequacy of faculty resources – full-time, part-time, adjunct.

Faculty Name	Faculty Classification and Rank	FTE	Role
Jeffrey Stolet	TT – Full	1.0	Faculty
Akiko Hatakeyama	TT – Assistant	1.0	Faculty
Jon Bellona	Career NTT, Instructional, Sr. Instructor 1	.67	Faculty

g. Other staff.

In the short term, additional faculty will not be required due to this new degree, because all courses listed as part of the curriculum are presently staffed.

h. Adequacy of facilities, library, and other resources.

Existing facilities and other resources are adequate to support the program

i. Anticipated start date.

Fall 2023

2. Relationship to Mission and Goals

a. Manner in which the proposed program supports the institution's mission, signature areas of focus, and strategic priorities.

The proposed degree is committed to discovery and creative and critical thinking that strives toward excellence in artistic expression. Because the degree focuses on the use of recent technologies to produce music and sound, the program will promote the creation of important cultural signatures: music that is truly of our time with the instruments anthropologically representing the cultural knowledge and values of our time. Additionally, the work related to data, data mapping, and data sonification relates to important developments occurring on the University of Oregon campus and around the world. The degree will also promote the excellence already established through the recognition our music technology faculty and students have received at international and national levels.

b. Manner in which the proposed program contributes to institutional and statewide goals for student access and diversity, quality learning, research, knowledge creation and innovation, and economic and cultural support of Oregon and its communities.

In a discipline that is substantially dominated by Caucasian males, we have cultivated a nurturing creative and educational environment that has dramatically shifted our student and faculty demographics to produce equality of opportunity for students who are traditionally underrepresented within the discipline of music technology. We will continue to work to enhance this environment that will produce additional opportunities for our students to develop and reach their full potential including special educational efforts involving travel support and guest artist visitations.

c. Manner in which the program meets regional or statewide needs and enhances the state's capacity to:

- i. improve educational attainment in the region and state;**
- ii. respond effectively to social, economic, and environmental challenges and opportunities; and**
- iii. address civic and cultural demands of citizenship.**

In a discipline that is substantially dominated by Caucasian males, we have cultivated a nurturing creative and educational environment that has dramatically shifted our student and faculty demographics to produce equality of opportunity for students who are traditionally underrepresented within the discipline of music technology. We will continue to work to enhance this environment that will produce additional opportunities for our students to

develop and reach their full potential including special educational efforts involving travel support and guest artist visitations.

3. Accreditation

- a. **Accrediting body or professional society that has established standards in the area in which the program lies, if applicable.**

NA

- b. **Ability of the program to meet professional accreditation standards. If the program does not or cannot meet those standards, the proposal should identify the area(s) in which it is deficient and indicate steps needed to qualify the program for accreditation and date by which it would be expected to be fully accredited.**

NA

- c. **If the proposed program is a graduate program in which the institution offers an undergraduate program, proposal should identify whether or not the undergraduate program is accredited and, if not, what would be required to qualify it for accreditation.**

NA

- d. **If accreditation is a goal, the proposal should identify the steps being taken to achieve accreditation. If the program is not seeking accreditation, the proposal should indicate why it is not.**

NA

4. Need

- a. **Anticipated fall term headcount and FTE enrollment over each of the next five years.**

Fall 2023 – 3 Students

Fall 2024 – 4 students

Fall 2025 – 5 students

Fall 2026 – 5 students

Fall 2027 – 6 students

- b. **Expected degrees/certificates produced over the next five years.**

Year 1 - 0

Year 2 - 0

Year 3 - 0

Year 4 - 1

Year 5 - 1

- c. **Characteristics of students to be served (resident/nonresident/international; traditional/ nontraditional; full-time/part-time, etc.).**

The program will be optimized for full-time students; however, the degree will be flexible enough to accommodate part-time students. We believe that the applicants will come to the program from various backgrounds. One source includes classically trained musicians who hold graduate degrees in music composition or in fields closely affiliated with computer music. We would especially seek to attract those applicants who have a record of musical performance. Because Music Technology at UO seeks to have a broad impact on the discipline, applicants who have a previous record of presenting their work at important conferences and festivals will be granted preference. Additionally, it is easy to imagine that the applicants could arise from the fields of computer science and engineering. As an indication of what we might expect in our future applicants, past and current students in our D.M.A. in the Performance of Data-driven Instruments held masters and doctoral degrees in music composition, masters affiliated with computer music and musical intermedia composition, and/or degrees in electrical engineering. Because the degree features extensive exposure to data mapping to sound and data sonification, we would expect to attract applicants who hope to pursue careers in both academic and industry research positions. We expect students recruitment to occur regionally, nationally, and internationally.

d. Evidence of market demand.

The degree program described in this proposal represents an evolution from a currently operational DMA degree that concentrates on the performance of data-driven musical instruments to a more balanced degree program. The diversification of scholarly and creative work resulting from an increase of FTE in the music technology area offers the opportunity to broaden its curricular studies. The breadth of study rebalances the degree program by enhancing profiles in data-driven composition, data sonification, artist/brand development, aesthetics and design, and cultural discourse. These changes shift the degree program from being less about musical performance to being more about academic inquiry and discourse and reflect the difference in the degree name – DMA to PhD.

e. If the program's location is shared with another similar Oregon public university program, the proposal should provide externally validated evidence of need (e.g., surveys, focus groups, documented requests, occupational/employment statistics and forecasts).

NA

f. Estimate the prospects for success of program graduates (employment or graduate school) and consideration of licensure, if appropriate. What are the expected career paths for students in this program?

The main objective of the proposed degree in Data-driven Music Performance and Composition is to provide students with an elegant and powerful framework to develop into substantial musical artists who create music that is truly of our time. This will centrally involve developing expert skill and knowledge related to realtime performance and composition of electroacoustic music with data-driven musical instruments, design and fabrication of data-driven musical instruments, data-driven instrumental performance techniques, and data sonification techniques. It would be my expectation that students who complete the degree will find employment in academic or research positions or in industry. Additionally, it is not far-fetched to think graduates from this program might find employment in music therapy related fields.

5. Outcomes and Quality Assessment

a. Expected learning outcomes of the program.

Principle Learning Outcome (Concept or Skill)	Part of curriculum where this is introduced	Part of curriculum where this is developed	How students demonstrate mastery
<p>We expect students to demonstrate substantial skill and knowledge related to 1) real-time performance and composition of electroacoustic music with data-driven musical instruments, 2) design and fabrication of data-driven musical instruments, 3) data-mapping strategies and techniques, 4) sound synthesis techniques, 5) data-driven instrumental performance techniques, and 6) data sonification techniques.</p>	<p>The above skills and knowledge will be developed and honed most especially in the following courses:</p> <p>MUP 769 Data-driven Instrument Performance (6 terms)</p> <p>MUS 571 Musical • Performance Networks</p> <p>MUS 550 SensorMusik</p> <p>MUS 570 History of Electroacoustic Music</p> <p>MUS 579 Data Sonification</p>	<p>As above, the skills and knowledge will be developed and honed most especially in the following courses:</p> <p>MUP 769 Data-driven Instrument Performance (6 terms)</p> <p>MUS 571 Musical Performance Networks</p> <p>MUS 550 SensorMusik</p> <p>MUS 570 History of Electroacoustic Music</p> <p>MUS 579 Data Sonification</p>	<p>In addition to successfully completing the required coursework, multi-day primary area comprehensive exams will be required.</p> <p>Additionally, our graduate programs require a regular regiment of presenting ones work both at the School of Music and Dance and at juried conferences in this country and around the world. Among those conferences are the International Computer Music Conference, the National Conference for the Society for Electro-Acoustic Music in the United States, the Kyma International Sound Symposium, and International Conference on New Interfaces for Musical Expression.</p>

b. Methods by which the learning outcomes will be assessed and used to improve curriculum and instruction.

Beyond the required coursework exist, which is rigorous and significant, the presentation and evaluation of student solo recitals and primary area comprehensive exam will provide the music technology area data upon which to reflect, and when necessary, the information to act directly to refine our curriculum and methods.

c. Nature and level of research and/or scholarly work expected of program faculty; indicators of success in those areas.

As the primary method for disseminating the new creative knowledge produced by the faculty teaching in the proposed degree program, original electroacoustic music will be presented and performed and topics related to the degree will be presented in lecture format and published in conference proceedings at the preeminent conferences and festivals in the discipline. The current faculty has an exceptional record in this arena. Among those juried conferences and festivals are the International Computer Music Conference, the National Conference for the Society for Electro- Acoustic Music in the United States, the Kyma International Sound Symposium, the International Conference on New Interfaces for Musical Expression, and Musicacoustica – Beijing.

6. Program Integration and Collaboration

a. Closely related programs in this or other Oregon colleges and universities.

There are no closely related programs in Oregon.

b. Ways in which the program complements other similar programs in other Oregon institutions and other related programs at this institution. Proposal should identify the potential for collaboration.

NA

c. If applicable, proposal should state why this program may not be collaborating with existing similar programs.

NA

d. Potential impacts on other programs.

NA

7. External Review

If the proposed program is a graduate level program, follow the guidelines provided in *External Review of New Graduate Level Academic Programs* in addition to completing all of the above information.

External Review was completed in January 2022.

Statewide Provosts Council – Proposal Summary

University of Oregon

Proposal for a Ph.D. in Data-Driven Music Performance and Composition

A brief description of the anticipated program

As a response to the undeniable rise in the importance of data, we propose a PhD in music that in no way recedes from music and music-making, but centrally relates to data-driven musical performance and composition as well as to data sonification. In data sonification, data is mapped to sonic parameters with the objective of articulating features in the data. Science and research is served through data sonification. Coursework in the proposed degree program that specifically addresses and acknowledges this data focused paradigm shift includes data-driven instrumental performance, musical performance networks, data-based instrument design and fabrication, and data sonification. The knowledge cultivated in this proposed course of study will position those who complete the degree well for successfully competing for both professional, research, and academic positions.

The degree program described in this proposal represents an evolution from a currently operational DMA degree that concentrates on the performance of data-driven musical instruments to a more balanced degree program. The diversification of scholarly and creative work resulting from an increase of FTE in the music technology area offers the opportunity to broaden its curricular studies. The breadth of study rebalances the degree program by enhancing profiles in data-driven composition, data sonification, artist/brand development, aesthetics and design, and cultural discourse. These changes shift the degree program from being less about musical performance to being more about academic inquiry and discourse and reflect the difference in the degree name – DMA to PhD.

Program location and modality (face to face, online, and/or hybrid)

The degree program will be offered in person on the University of Oregon campus, Eugene.

Anticipated start date

Fall 2023

Anticipated enrollment, at launch and goals for 5 and 10 years out (provide anticipated headcount for Fall term at launch, 5 years and 10 years).

Student enrollment will develop gradually over the decade. We will initially concentrate on quality rather than quantity. The anticipated doctoral student enrollment is: Fall 2023: 3 students; Fall 2028: 6 students; and Fall 2033: 10 students.

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An abbreviated description of how the program contributes to addressing statewide needs and goals and aligns with the university's mission and strategic plan.

The knowledge cultivated in this proposed course of study will position those who complete the degree well for successfully competing for both professional, research and academic positions. The degree places at its center the cultivation of knowledge and skills related to understanding and improving our data-rich world. Career opportunities centered on data and its understanding are extensive. The UO Data Science degree website states that, “search [“data science” on Indeed](#) and you’ll see more than 10,000 opportunities around the country.”¹ In the new degree program, the skills and knowledge developed fall within the areas of data sonification and data mapping, which may be applied to professional work in a broad range of fields. Moreover, because musical performance involves physical movement and movement can produce data that can be mapped to sound, a direct connection exists between skills and knowledge developed within the proposed degree and biomedical fields,² neuroscience,³ robotics,⁴ and human-computer interaction (HCI).⁵ Additionally, mapping data to sound to articulate features in a data set can extend to other fields such as mathematics, ecology,⁶ cybersecurity,⁷ and astrophysics.⁸ There are also numerous examples of data sonification being used to advance greater accessibility to all populations. These technical skills and knowledge are amplified by the degree’s cultivation of creative thinking in all aspects of its work. The ability to creatively apply skills and knowledge is a vital attribute in virtually every professional field. It is the aspiration of the degree to cultivate and train creative thinking that will produce music that is truly of our times. Finally, we can reasonably speculate what enrollments for the new degree will be in part based on the enrollment history in the D.M.A. in Performance of Data-driven Instruments. The proposed degree is a bid broader, so we might predict it will perform at an even higher level.

In these ways the degree offers career opportunities in Oregon and beyond and is aligned with the University of Oregon mission to “work at a human scale to generate big ideas”, and more specifically the university’s Academic Initiatives, such as Data Science and Innovation, which are intended to focus and strengthen the university’s research around core themes to address major societal challenges.

Contact

Jeff Stolet

Professor in Computer Music

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End Notes:

¹ The URL for UO’s Data Science degree program is: <https://datascience.uoregon.edu> .

² As one biomedical example, see Stephen Barrass and Gregory Kramer, “Using Sonification,” *Multimedia Systems 7*: 23–31, Springer-Verlag, (1999), https://ccrma.stanford.edu/courses/120-fall-2005/using_sonification.pdf .

³ For an example where neuroscience and sonification intersect, see Paxtyn Merten, “Active Listening Workshop, Neuroscience, Psychoacoustics and Sonification,” <https://web.northeastern.edu/activelisting/neuroscience-psychoacoustics-and-sonification/> .

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⁴ Lisa Zahray, Richard Savery, Liana Syrkett, and Gil Weinberg, "Robot Gesture Sonification to Enhance Awareness of Robot Status and Enjoyment of Interaction," *2020 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, <https://doi.org/10.1109/RO-MAN47096.2020.9223452> .

⁵ Georgia Institute of Technology, School of Psychology, Sonification Lab, <http://sonify.psych.gatech.edu> .

⁶ Jens C. Hegg, Jonathan Middleton, Ben LucaRobertson, and Brian P.Kennedy, "The sound of migration: exploring data sonification as a means of interpreting multivariate salmon movement datasets," 2018, *Heliyon*, Volume 4, Issue 2, <https://www.sciencedirect.com/science/article/pii/S2405844017317188> .

⁷ Daniel Tkacik, "Do you hear what I hear? A Cyberattack," Security and Privacy Institute, Carnegie Mellon University, 2021, <https://www.cylab.cmu.edu/news/2021/07/30-sonification.html> .

⁸ NASA offers a glimpse into their use of data sonification at: <https://www.nasa.gov/content/explore-from-space-to-sound> .

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Institution: University of Oregon

Program: Ph.D. in Data-Driven Music Performance and Composition

Action: At the **August 4, 2022** meeting, the Statewide Provosts Council approved a new program for **University of Oregon, Ph.D. in Data-Driven Music Performance and Composition** to move forward to the Oregon Higher Education Coordinating Commission for its review and approval. The **University of Oregon** Board of Trustees approved the **Ph.D. in Data-Driven Music Performance and Composition** program at its **May 19, 2022** meeting.

Eastern Oregon University

Dr. Matt Seimears, Interim Provost

Approved

Opposed

Abstained



Oregon State University

Ed Feser, Provost

Approved

Opposed

Abstained



Portland State University

Susan Jeffords, Provost

Approved

Opposed

Abstained



University of Oregon

Patrick Phillips, Provost

Approved

Opposed

Abstained



Oregon Health & Science University

Marie Chisholm-Burns, Provost

Approved

Opposed

Abstained



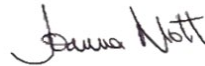
Oregon Tech

Joanna Mott, Provost

Approved

Opposed

Abstained



Southern Oregon University

Susan Walsh, Provost

Approved

Opposed

Abstained



Western Oregon University

Rob Winningham, Provost

Approved

Opposed

Abstained

