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Hoijer '15 Studies Correlations Between Mathematics and Music

July 29, 2014

BLOOMINGTON, Ill. — Illinois Wesleyan University student Natalie Hoijer '15 (Arlington Heights, Ill.) is combining her academic majors to investigate the relationships between mathematical symmetries and classical music.

“The connection between **math** and **music** has always fascinated me and by studying both of them, I see how they both seem to rely on each other,” said Hoijer, who is double majoring in both fields. “They both parallel in many ways, such as in the mathematics of the sound produced by instruments, and tuning, probability and group theory.”

As an **Eckley Summer Scholar and Artist**, Hoijer is researching mathematical symmetries such as the Golden Mean, the Fibonacci Series and palindromes, and how they apply to the composition of concert music. Under the mentorship of School of Music Director Mario Pelusi, she is exploring how these techniques affect the styles and structures of a variety of musical compositions and how these works compare to compositions that do not use mathematical symmetries.

As part of her project, Hoijer is also teaching a class titled “Unleashing Music’s Hidden Blueprint” at the **Illinois Chamber Music Festival** held through Illinois Wesleyan’s School of Music. She incorporates her research and findings into her lesson plans, and creates hands-on activities to help students understand the theories and foundations on which compositions are based.

“I love sharing my enthusiasm for math and music with students and seeing them enjoy the content as much as I do,” said Hoijer. “The chance to be in front of a classroom of students, create my own lesson plans and share my discoveries, as well as help students reach discoveries of their own is an exciting experience.”

After receiving feedback from surveys, projects and activities that she has completed with her class, Hoijer said she has been able to measure quantitatively the aesthetic quality of contrastingly structured compositions. She hopes to discover which compositional tool is most effective in enhancing the overall structure of a work of music, information she plans on presenting or publishing through a research paper.

The Eckley Summer Scholars and Artists endowment supports summer research and creative activity for several students each year, enabling them to stay on campus over the summer under the direction of faculty mentors. The program was established as one aspect of a major gift to the University by President Emeritus Robert S. Eckley, his wife Nell and the Eckley Family Foundation, before he passed away in 2012.



Natalie Hoijer '15 leads activities to help students understand the theories behind their music

“It has been wonderful to have unencumbered time devoted to dissecting my research and also invigorating to make these discoveries,” said Hoijer. “To transform a subjective field, such as music into an objective understanding with colors, shapes or proportions, has been a rich and gratifying experience.”

[See all 2014 Eckley Scholars](#)

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