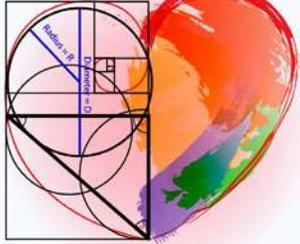


# Integrating science, math into arts, humanities courses

In a recent Teaching Tip, UAF associate professor Mary Beth Leigh, gave examples of how she [integrated art and humanities into her science classroom](#). The same process of transdisciplinary course integration can happen in arts and humanities classes by including mathematics and science into course activities. The practice of incorporating aspects of science, technology, engineering, art and mathematics (STEAM) [into curriculum](#) is the focus of *The Integration of the Humanities and Arts with Sciences, Engineering, and Medicine in Higher Education* by the [National Academy of Sciences](#).



An obvious transdisciplinary integration happens in mathematics and art. Without mathematics, artists would have a hard time relating perspective, proportion or applying the [golden ratio](#) to their work. This is demonstrated through a collaborative work by Luca

Pacioli and Leonardo da Vinci titled, *De divina proportione* printed in the 1500s. The study of mathematics carried over with other master artists like [Piero della Francesca with geometry](#) and [M.C. Escher with tessellation and polyhedra](#). In the article [Catastrophically creative: Salvador Dalí and Maths](#), Silvia Benvenuti wrote:

Paraphrasing, Dalí suggests to the young artist a “recipe” for beauty: put close geometric constraints at the base of a picture, and then let your creativity flow, sure that the result will be aesthetically (sic) harmonic and nice to see. (Benvenuti, 2017)

You can see further integration of mathematics and science in music. Scales, rhythm, tone, pitch, and harmonics are just a few examples of many connections. In the video [Music and Mathematics](#), Eugenia Cheng, a pianist and mathematician, talks about how Bach was able to write music in every key, based on a mathematical solution. An understanding of physics may help with [understanding musical harmonics](#) specifically with [electronic music](#).

If you take a look at the current [General Education Requirements \(GER\) for a baccalaureate degree at UAF](#) (pdf),

most of the Humanities credit options come from enrolling in language classes, which speaks to the phenomenon of technology bringing the world together whereby becoming a global citizen will be increasingly important. Furthermore, as industry is making fast strides in using machine language and artificial intelligence to enhance our everyday activities, being familiar with another language, including coding, may well give a graduating student a step up in getting a job and being part of this evolving technology. In addition to integrating aspects of culture and history into language courses which is already in practice, topics related to mathematics, weather, economics, scientific achievements, or [indigenous ways of knowing](#) within the culture can all be themes for discussion and inquiry that relate to STEAM.

A transdisciplinary objective is not only about learning skills or about applying skills to a completely different situation, but also an opportunity to have profound conversations about ethics, logic and reasoning that connects all disciplines. There is plenty of room for [philosophical discussions in all fields related to STEAM](#). As the curriculum in higher education has become more specialized, it is important to be open to including transdisciplinary concepts into all courses.

So what does this mean for you as a teacher?

- Look at your detailed class list in UAOnline and see what disciplines your students are coming from.
- Prepare in advance for how you might engage those students outside of your discipline.
- Talk to a colleague in a different discipline and trade curriculum ideas to integrate strengths from each field into class activities.
- Take it one step farther and develop a co-listed course where students are able to integrate both subjects into a combined and holistic outcome.

Visit one of [UAF eLearning's open labs](#) to brainstorm ideas about how you might work with STEAM and see a new population of students who are motivated and engaged, and perhaps, grow opportunities for double majors!

## RESOURCE

Kaczmarek, A. (2015). [35 Lessons that Explore the Beautiful Pairing of Math and Art - The Art of Education](#).