

Engineering a musical analysis



Elaine Chew has melded her industrial engineering and musical careers.

Music can express and elicit emotion. But how?

An industrial and systems engineering professor and her graduate students are using computational and other engineering tools to look for answers.

Elaine Chew, who has a career as a distinguished concert pianist in addition to her engineering teaching and research, teaches “Computational Modeling of Expressive Performance” at the University of Southern California.

Projects from this spring’s class, which is just its fourth offering, range widely and are interdisciplinary. One student found a trove of silent movie scores written to evoke specific emotions and analyzed the scores’ characteristics. Another created note-by-note comparative graphs of various master violinists’ performances of a Bach sonata to evaluate their dynamic shaping.

Attacking problems in computational modeling of music draws on such varied disciplines as music theory, cognitive science, artificial intelligence, experimental psychology, mathematics, signal processing, and neuroscience, Chew said. She credits her department, the engineering school deans, and the provost for allowing her to pursue a nontraditional line of academics. And she is looking ahead to more courses that meld engineering and music.

“My department chair, James Moore, has encouraged me to forge ahead in creating an undergraduate counterpart to the class because he sees the potential of such courses in recruitment and retention of young and inquiring minds to engineering,” Chew said.

So how does music elicit emotion? Chew and her students don’t know yet, but check back in a few years.