

Music, Math, and Motion – Arun Chandra and E.J. Zita

End-of-Program description – Fall quarter 2008 (15 Dec. draft)

We explored composing music with computers and the physics of music through lectures, workshops, readings, seminars, and individual and group student projects. Our primary texts were *Musimathics* by Loy (2006) and *Music and Mathematics from Pythagoras to Fractals*, by Fauvel et al. (2003). Seminar texts included *Life of Galileo* by Brecht, *Contact* by Sagan, selections from *Whose Science/Whose Knowledge* by Harding, *Copenhagen* by Frayn, *the Harmonograph* by Ashton, and *His Master's Voice* by Lem. These were supplemented by articles such as “The Unreasonable Effectiveness of Mathematics” by Wigner, astrophysics articles on acoustic oscillations in stars and the cosmic background radiation, and articles on information theory by Shannon and Weaver. Guest lectures were giving by two composers and an instrument builder. Students attended a performance of a performance of contemporary and satirical music, a performance of multi-channel computer music with and without live instruments, and a performance of the opera “Dr. Atomic,”

We met once a week for lectures by both faculty, generally twice weekly for seminars, once weekly for computer music programming workshops, and once weekly for workshops on physics of sound or project planning. Assignments included weekly Points, Insights, and Questions (PIQs) posted online before seminar by student teams, individual computer music programming assignments, and individual pre-labs and team reports for physics and project workshops. Each student was expected to complete two short “studies” in computer music. In the first half of the quarter, students in each team took turns articulating and developing plans for their creative/research project and responding online to teammates’ plans. In the last half of the quarter, teams worked toward the performance of their creative project and the presentation of their research for the Green Hill School (a juvenile detention facility). Credit was based on successful completion of these activities.

Prerequisites included basic music theory and facility with algebra. Learning goals included the fundamentals of programming in C; improved quantitative reasoning skills and understanding of the physics of music; stronger teamwork and planning skills; expanded abilities to appreciate new forms of music; and deeper understanding of connections between music and science.

16 Credits total – Equivalencies:

- 4 computer music composition in C
- 4 physics of sound
- 4 creative and research project and performance
- 2 seminar readings
- 2 class participation