

Dr. Matt Klassen earned his Ph.D. in mathematics from the University of Arizona in 1993, specializing in number theory and algebraic geometry. Since joining DigiPen in 1999, his interests moved to mathematics relating to computer graphics and geometric modeling with particular emphasis on splines. He went on to develop special courses on quaternions with application to computer graphics and animation, and spline curves through the perspective of linear algebra. Some of this course work led to a paper: "Generalized Vandermonde Determinants and Splines," presented at a conference in honor of Peter Borwein, May 2008, at Simon Fraser University.

Klassen also developed an interest in combinatorial game theory and has been teaching a course in the subject which is attended by undergraduate and graduate students in computer science. At least one graduate student chose to do a masters thesis in this area under the supervision of professor Klassen, entitled "Solving the 4x3x3 Three Dimensional Domineering Game."

Klassen's thesis work, and joint work with Debarre, on points of low degree on curves, has given rise to follow-up research on this topic at Harvard and MIT, as recent as 2018. Also in this vein, Klassen explored non-associative structures on curves, which led to a paper: "Non-Associative Loops on Fermat Curves of Odd Degree," presented at the Summer Workshop on Computational Number Theory, IRMACS Center, Simon Fraser University, September 2009.

In 2011, Dr. Klassen laid the groundwork for two new programs at DigiPen, requested by President Claude Comair: the BA in Music and Sound Design, and the BS in Computer Science in Digital Audio (originally BS in Engineering and Sound Design). He has taught courses in Mathematics of Music (for the BA program), and in Digital Signal Processing (for the BS program). In spring semester 2018, Klassen taught a special topics course on "Computation and Modeling of Head-Related Transfer Functions," which explored methods of spatial sound processing with applications for virtual and augmented reality. In

August 2018 the conference “Audio for Virtual and Augmented Reality” was hosted by DigiPen. Chaired by Klassen, and jointly organized by DigiPen and Dr. Edgar Choueiri at Princeton University 3D3A Lab, AVAR 2018 was recognized as a leading conference in this fast growing field of immersive audio. A follow-up conference, co-chaired by Klassen and Music Department colleague Professor Lawrence Schwedler, was offered in August 2020. This groundbreaking event was the first AES conference to be held in virtual reality, using Microsoft’s AltspaceVR technology.

Klassen is an avid classical guitarist, studying and performing on this instrument since age 11. In 2019 he received another plucked instrument, built for him by luthier and friend John Rollins, a baroque replica of the “theorbo”, a 14-stringed relative of the lute with an extended neck. Klassen has contributed to DigiPen Music Department recitals on both guitar and theorbo, and continues to be an active member of the Pacific Northwest guitar communities.

Also in 2019, Klassen finished a paper on Mathematical Music Theory, a subject which is among his top interests. The paper, titled “Constraint-based systems of triads and seventh chords and parsimonious voice-leading”, was presented at the Madrid Conference MCM 19, in June of 2019. In Summer of 2020 Klassen offered an interdisciplinary online course on Mathematical Music Theory for DigiPen students. Since Fall 2020 Klassen holds a joint appointment as professor of Mathematics and Music.

“DigiPen provides a dynamic context for teaching and learning mathematics and its many applications,” Klassen says. “Students are highly motivated and generally appreciate the power of mathematics, which shows up in their project work in signal processing, graphics, audio and game development.”

Selected Publications

- Klassen, M.J., *Constraint-based systems of triads and seventh chords, and parsimonious voice-leading*, M. Montiel et al (Eds.), MCM 2019, LNAI 11502, pages 185-198, 2019.
- Debarre, O., Klassen, M.J., *Points of Low Degree on Smooth Plane Curves*, Journal für die Reine und Angewandte Mathematik, 446 (1994), 81-87