Talk: Extending computational frontiers in landmark-based geometric morphometric methods

Speaker: Professor Michael L. Collyer
Program Director for MS Biology, Chatham University; Geomorph

Abstract:
Geometric morphometrics has become a discipline for which high-dimensional data are commonplace. The analysis of high-dimensional data confronts two challenges. First, having data comprising more variables than observations means abandoning a reliance on parametric statistical methods. Recent developments in non-parametric alternatives based on Monte Carlo resampling algorithms have greatly overcome this challenge. However, and second, another challenge is making such analytical methods feasible when they incur large computational burdens, even for powerful computers. Although simple algebraic equations can elucidate solutions for high-dimensional data, algorithms for real-data computations can be varied and complex. Providing efficient data analysis experiences for empirical researchers means probing various algorithmic alternatives for programmers to find best methods for different data types. Through this programming exploration for high-dimensional shape data, it becomes possible to envision new methods for shape analysis. In this seminar, I discuss some recent computational advances associated with two common practices with landmark-based geometric morphometric data: algorithms for sliding semi-landmarks and analysis of variance. I also show through interesting examples that with new methods inspired by computational proficiency, a paradigm shift is needed for how we approach high-dimensional landmark data.