## APPLIED AND NUMERICAL ANALYSIS SEMINAR

Thursday March 31 Period 9

**Speaker:** Shangyou Zhang | University of Delaware

**Title:** A four-order superconvergent CDG finite element method for the biharmonic equation

**Abstract:** In a conforming discontinuous Galerkin finite element method, the same weak formulation is used as the conforming ( $C^1$ ) finite element for the biharmonic equation but the finite element space is formed by discontinuous piecewise polynomials. We design a special discontinuous Galerkin finite element method which converges at four orders above the optimal order for the polynomial degree  $k \ge 3$ , on triangular/tetrahedral meshes. For  $P_1$  and  $P_2$  finite elements, we have two orders and three orders of superconvergence, respectively. Such a  $P_k$  ( $k \ge 3$ ) finite element solution is locally lifted to a  $P_{k+4}$  polynomial solution which converges at the optimal order. Numerical tests are presented, verifying the theory.