MATH 624 Euclidean Geometry (3:3:0) *Prerequisites: MATH 290, MATH 322 or equivalent.* Euclidean space, geometry of k-dimensional planes, the affine structure of Euclidean space, rigid motions and similarities, parallelotopes and volumes, convex polytopes, quadric surfaces, additional topics by instructor's choice.

MATH 781 Advanced Methods in Applied Math (3:3:0) *Prerequisites: Permission of instructor. Different backgrounds may be appropriate, but generally, a student is expected to be an upper level graduate student who has already taken graduate courses including differential equations and dynamical systems.* Bifurcation theory and perturbation methods for solutions in ordinary and partial differential equations. This course will develop and apply these mathematical tools in current scientific fields, such as biology, materials science, or financial mathematics.

MATH 784 Nonlinear Functional Analysis (3:3:0) *Prerequisites: Permission of instructor. Different backgrounds may be appropriate, but generally, a student is expected to be an upper level graduate student who has already taken Linear Analysis. Since the applications given in the course are for differential equations, some familiarity with differential equations is extremely useful.* Techniques in nonlinear functional analysis with applications. Contraction mapping principle, Frechet and higher derivatives, the implicit function theorem, Lyapunov-Schmidt method, and bifurcation theory. Finite and infinite dimensional degree theory with applications in partial differential equations.

MATH 790 Classical Potential Theory (3:3:0) *Prerequisites: Math 675 and 776.* Potential theory of Laplace's equation in Euclidean space. Harmonic functions, superharmonic functions, potentials, polar sets and capacity, the Dirichlet problem, the Martin boundary, boundary behavior of superharmonic functions using real variable techniques and minimal fine limit techniques.