Tentative: Numerical Analysis PhD Degree Track

by Donald A. French

This document provides general curriculum requirements and guidelines for Department of Mathematical Sciences PhD students wishing to concentrate on the analysis of numerical methods for partial differential equations. At this time, their thesis research would be under Professor French.

Many of these offerings will be of interest to students in other disciplines such as engineering, chemistry, physics, and bioengineering.

Prelim Courses:

1. **Numerical Analysis (514, 515, 516)**.
2. **Partial Differential Equations (627, 628, 629)**.
3. **Pure Mathematics or Statistics:** Students can take their third prelim in either a pure mathematics area choosing Complex Variables (601, 602, 603), Real Analysis (607, 608, 609), or Topology (604, 605, 606) or in Statistics/Probability choosing either Advanced Theory of Statistics (631, 632, 633) or Probability (634, 635, 636).

Breadth Requirement:

1. **Differential Equations (616, 617)** Two quarters. Also, one other 2-quarter 600-level sequence different from those chosen for prelim courses.
2. **Numerical Methods Specialization:**
   (a) **Applied Mathematics Practicum** (517)
   (b) **Nonlinear Optimization** (526)
   (c) **Numerical Methods in Applied Mathematics** (561).
   (d) **Programming:** Students should take courses in a variety of programming languages if they have not done so as undergraduates. MATLAB programming is especially encouraged.

Dissertation Research: The student's thesis would typically involve the analysis of methods such as finite element or finite difference.

Program of Study: (Sample course schedule).

First Year Courses:

1st Qtr	**2nd Qtr**	**3rd Qtr**
NA 514	NA 515	NA 516
Adv Calc 504	Adv Calc 505	Adv Calc 506
Appl Lin Alg 555	PDE & FA 553	PDE & FA 554

Second Year Courses:

1st Qtr	**2nd Qtr**	**3rd Qtr**
ODE 616	ODE 617	
Pure Math I or Stat I	Pure Math II or Stat II	Pure Math III or Stat III
PDE 627	PDE 628	PDE 629

Third Year Courses:

1st Qtr	**2nd Qtr**	**3rd Qtr**
Applied Math Practicum 517	Numerical Methods in Appl Math 561	Nonlinear Optimization (526)
600-level breadth I	600-level breadth II	

The student would take the NA prelim after the first year and then the PDE and Pure Math or Statistics/Probability prelims after the second.