Pure and Applied Analysis

Hey kids, Fonz here. I've noticed a disturbing trend in recent years here at Clemson University. It seems that the word “analysis” has become a dirty word along the lines of “bridge course” and “in-class final.”

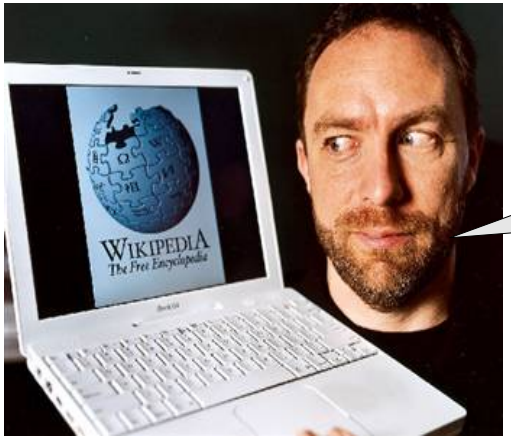
In reality, the study of analysis has widespread application and the sky is the limit for a young, ambitious graduate student looking at an analysis focus.

But don't just take my word for it, let's have a look and you'll see you and analysis go together like Joanie and Chachi.

What is Analysis?

Tough question. Let me outsource this.

What is Analysis?



Mathematical analysis has its beginnings in the rigorous formulation of infinitesimal calculus. It is a branch of pure mathematics that includes the theories of differentiation, integration and measure, limits, infinite series, and analytic functions.

The study of analysis provides a basic understanding of qualitative and quantitative problem-solving techniques, the ability to analyze new areas of interest, and the ability to interact with colleagues from other disciplines in a problem-solving situation.

What is Analysis?

Ayyyy, thanks, boys. Sounds pretty good. Let's look at the course list at Clemson.

Analysis at Clemson

Linear Analysis (821)
Measure and Integration (822)
Complex Analysis (823)
Dynamical Systems (825)
Partial Differential Equations (826)
Neural Networks (827)
Fourier Series (831)
Optimal Control (837)
Applied Mathematics (841)
Numerical Analysis (861)
Functional Analysis (927)

Analysis at Clemson

Quite a list of topics. Now to look beyond the classroom into types of potential research problems. The analysis subfaculty at Clemson researches signal analysis, mathematical biology, financial analysis, control theory, medical imaging, and inverse problems to name a few.

Modeling

The need for modeling crosses all branches of science.

Here there is a lot of research into modeling financial and biological systems (cell structures, disease spread, etc). It is important to both accurately model these phenomena and control the instability of such models.

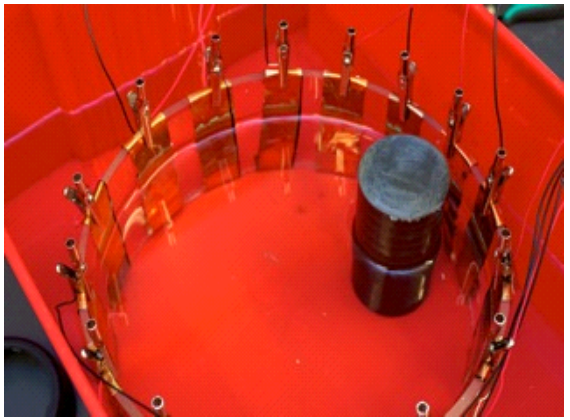
Modeling

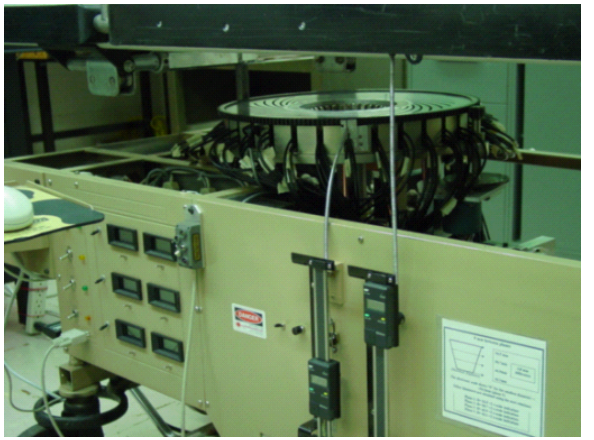
$$\frac{\partial V}{\partial t} + \frac{1}{2}\sigma^2 S^2 \frac{\partial^2 V}{\partial S^2} + rS\frac{\partial V}{\partial S} - rV = 0.$$

Medical Imaging

New techniques are constantly developed in the name of better, safer medical imaging. Each of these technologies has a different governing mathematical model.

Medical Imaging





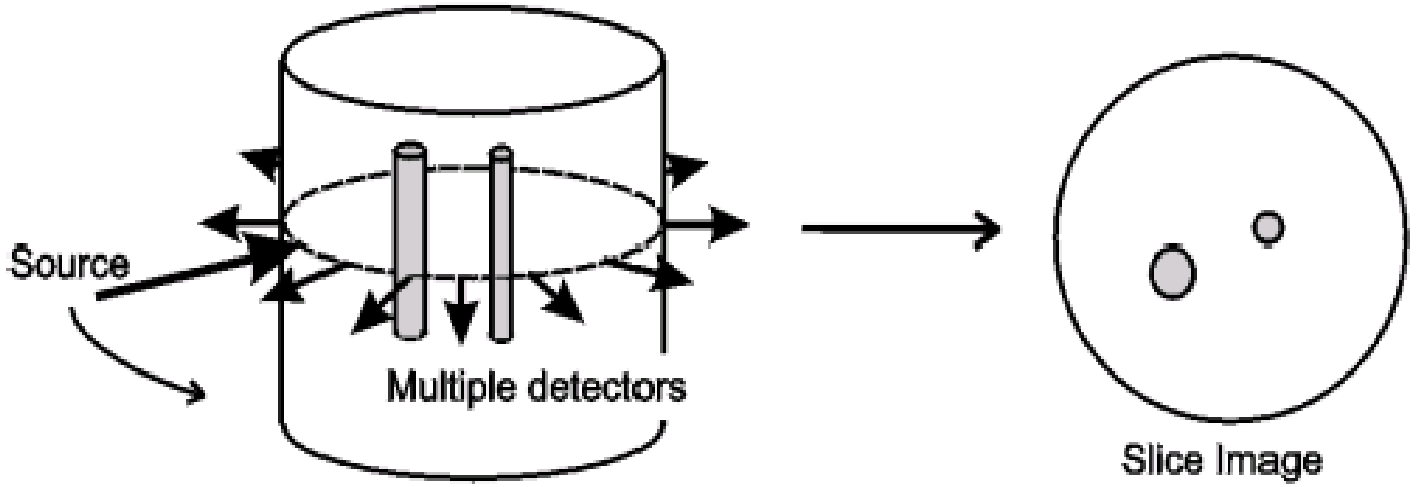
Inverse Problems

Solving a forward problem is easy. Take your model parameters and evaluate to find the data.

Solving an inverse problem is hard. Take the data and find the model parameters.

Applications in medical imaging, ecological studies, geological studies, signal processing, and others.

Optical Tomography



$$\frac{\partial L(\vec{r},\hat{s},t)/c}{\partial t} = -\hat{s}\cdot\nabla L(\vec{r},\hat{s},t) - \mu_t L(\vec{r},\hat{s},t) + \mu_s \int_{4\pi} L(\vec{r},\hat{s},t) P(\hat{s}'\cdot\hat{s}) d\Omega' + S(\vec{r},\hat{s},t)$$

Analysis outside Clemson

Those are just a select few opportunities in analysis.

The broad nature of analysis as defined by the Clemson Math Department allows for qualifications to all types of future employment. Anywhere you can think that incorporates advanced mathematics into problem solving is apt for an analysis student.

Possible industries: Medical Imaging, Energy/Smart Grid, NSA, NIH, Defense Contractors, Ecological and Geological, etc.

Pure and Applied Analysis

So remember kids, Analysis is your friend.

Sincerely,
Arthur Fonzarelli and Jack Cooper