Applied and Industrial Mathematics
Undergraduate thesis topics
Predicting and prescribing distortion of thin glass sheets.

Investigate complex chemical processes. Examples include: the carbonate system, responsible for ocean acidification; the Acheson process, responsible for commercial production of silicon carbide.

Tissue engineering: the optimal placement of cells using magnetic micro-beads.
C. Sean Bohun (possible topics: 2 of 2)

- Modelling processes that characterize unknown samples to increase their current capabilities. Examples include: rotating disk apparatus, high resolution melt analysis and cyclic voltammetry.
- Develop mathematical tools to help design high power tuneable lasers.
- Model biological processes. Examples include: brain vascular systems and bone remodelling.
Jane Breen (possible topics)

- Clustering algorithms in directed networks (with applications to road traffic dynamics)
- Kemeny's constant and graph connectivity
- Sensitivity analysis of Markov chain models
Mehran Ebrahimi (possible topics)
- Medical image registration
- Medical image segmentation
- Medical image fusion
Greg Lewis (possible topics)

- Transitions in atmospheric flow patterns
- Mathematical models for electro-location in weakly electric fish
- Mathematical aspects of MRI

\[
\frac{\partial u}{\partial t} = \nu \nabla^2 u - 2\Omega \times u + (ge)
\]

\[
\frac{\partial T}{\partial t} = \kappa \nabla^2 T - (u \cdot \nabla)T,
\]

\[
\nabla \cdot u = 0
\]

\[
\nabla \cdot B = 0,
\]

\[
\nabla \times E = -i\omega B,
\]

\[
\nabla \times B = \mu ((\sigma + i\omega \epsilon) E + i\omega H)
\]
Lennaert van Veen (possible topics)

- Phase transition in interface formation. Will include elements of: theory of interface formation, stochastic partial differential equations, numerical methods, data analysis.

- Bi-stability and critical noise. Includes: "flickering" noise in dynamical systems, the telegraph process, simple simulations.