Applied Mathematics in Second Year and beyond

	Semester 1	Semester 2
	MA20222 *Numerical Analysis*	**MA20221** *Mod. and Dy. Sys.*
	MA20220 *ODEs and Control*	**MA20223** *PDEs and Cont.Mech.*

MA20222 Numerical Analysis

Mathematical models typically cannot be solved without numerical methods.

Course studies practical methods for approximation, solving differential equations, solving large numbers of linear equations....Four year 3/4 units follow directly... useful for mathematical placements

“Applied Analysis” is used to rigorously assess reliability and efficiency of methods.

“Computing” uses MatLab, real number arithmetic.

Required programming skills are at the elementary end of XX10190. Some of the Discrete Maths is useful.

75% exam, 25% continuous assessment

MA20220 Ordinary Differential equations and Control

Introduces methods of solving (possibly large) systems of linear ordinary differential equations.... a key problem in mathematics.

Makes use of linear algebra and analysis from year 1, and also the type of thinking used in Methods and Applications 1.

Introduces “transform methods” which are ubiquitous in applied maths.

Applications in Control Theory.. leads directly to four year 3/4 units.

100% Exam

MA20221 Modelling and Dynamical Systems

Teaches modelling skills essential to the applied mathematician in a multidisciplinary context... useful for mathematical placements.

Essential for some later units e.g. in Mathematical Biology, Nonlinear Systems and Chaos

Models will be constructed from linear algebraic equations, differential and integral equations and difference equations.

Most relevant background: Methods and Applications 1, but skills in analysis and algebra also needed. First Semester course ODEs and Control a prerequisite.

Some computing skills - but not programming - are assumed (e.g. familiarity with USE of matlab - well covered by XX10190).
75% exam, 25% assessed coursework

MA20223: Partial Differential Equations and Continuum Mechanics

Introduces partial differential equations for the first time.

These are differential equations whose solutions depend on more than one independent variable - e.g. temperature in a body may depend on space and time.

Assuming simple geometry, method of solution: separation of variables, Fourier Series (very broadly useful) .

Also introduces continuum mechanics (modelling physical problems like fluid flow using partial differential equations). Builds on second year Algebra, Analysis, ODEs and Control.

100% exam

A look to later years

Numerical Analysis leads directly to:
MA30051, MA30170, MA30060, MA40050, MA40171
“advanced numerical analysis”

ODEs and Control leads directly to:
MA30046, MA40061, MA40062, MA40045, MA40048
“advanced applied differential equations”

Modelling and Dyn. Sys. leads directly to:
MA30047, MA30063, MA40197, MA30060
“mathematical biology”

PDEs and Cont. Mech. leads directly to:
MA30044, MA30059, MA40065, MA40049
“physical applied maths”

complementary options from Pure Maths: MA30041, MA30056, MA40203

Modern applied mathematicians should also educate themselves in probability and statistics....

Remember:
Some second year options may be taken in year 3, so you may open a different “stream” of options in year 3 even if you did not choose this in year 2.

These slides available at

`http://people.bath.ac.uk/masigg/options`