UPPSALA UNIVERSITY
DEPARTMENT OF MATHEMATICS
Jordi-Lluís Figueras

Applied Mathematics
Fall 2016

Applied Mathematics

The course Applied Mathematics 1MA148 consists of 18 lectures.

Course literature

J. David Logan, *Applied Mathematics*, Third Edition, Wiley.

Teaching

The lectures intend to give an overview of a number of basic methods and techniques in applied mathematics. In my pursuit of introducing as many topics methods through examples. Basic ideas will be given priority to precise statements and proofs. Indeed, parts of the subject, such as asymptotic analysis, to some extent constitute a collection of methods which must be adapted to the problem at hand, rather than a collection of theorems.

A syllabus of both courses can be found below.

Syllabus	
Contents	Sections in the book
Introduction.	1.
Perturbation methods.	2.1–2.6
Calculus of variations.	3.1–3.6
Dynamical systems.	1.3–1.4, 5.1–5.2
Introduction to partial differential equations.	6.1–6.3, 7.1–7.4
Sturm-Liouville problems and eigenfunction expansions.	4.1–4.2, 6.4
Integral equations.	4.3

Although much of the lecture time will be devoted to concrete problem solving, you are strongly advised to solve additional problems on your own.

A preliminary lecture plan (not carved in stone), which can also seen as an outline of the course itself, can be found below. I will certainly not have time to cover everything in class, during which I can only hope to explain the basic ideas. You are expected to study the rest on your own.

Preliminary lecture plan	
Lecture	Contents
1	Introduction to the course.
2	Perturbation methods (I).
3	Perturbation methods (II).
4	Perturbation methods (III).
5	Calculus of variations (I).
6	Calculus of variations (II).
7	Calculus of variations (III).
8	Dynamical systems (I).
9	Dynamical systems (II).
10	Dynamical systems (III).
11	Introduction to partial differential equations (I).
12	Introduction to partial differential equations (II).
13	Introduction to partial differential equations (III).
14	Sturm-Liouville problems and eigenfunction expansions (I).
15	Sturm-Liouville problems and eigenfunction expansions (II).
16	Integral equations (I).
17	Integral equations (II).
18	Integral equations (III).

Examination

There will be a written exam. Maximum score: 40 points. A total score of 18 is needed for the grade 3, 25 for the grade 4, and 32 for the grade 5.

Uppsala, 23th of August 2016.

Jordi-Lluís Figueras
figueras@math.uu.se