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MA50200: Topic Review in Applied Mathematics Information Sheet

Aims and Objectives

This course has several aims. First of all we would like to introduce you to some **interesting and important modern topics in applied mathematics**. We will describe some important **mathematical tools** that are used/have been developed in these fields. You will then get the chance to learn more about a topic of your choice by **studying some key papers in the field**.

However, this course aims also at developing your **writing and presentational skills**. You will have to write a **a short review of the topic** you have chosen at a level appropriate for an MSC student such as yourself to read, and give a **presentation** on it to your peers. You will also learn through **peer assessment** how to **critically analyse** other people's work. These are all **very important skills** that are going to be essential for your future success in a **professional career in industry** or a **career in academia**.

Course Structure

Introduction to 4 Topics in Applied Mathematics (Weeks 2-5).

Week 2: *Inverse Problems – Tomography and Data Assimilation*

Week 3: *Discrete Mathematics – Networks and Complexity*

Week 4: *Multiscale Problems – Homogenisation, Upscaling, Data Uncertainty*

Week 5: *Numerical PDEs – Multigrid and Applications*

(Unless you are told otherwise, we will meet 3 times each week during those 4 weeks.)

Review of a Topic of Your Choice. We will provide you with a **list of suitable papers and/or books** related to the four topics above. Each of you will have to choose a topic that they are interested in, and study relevant papers in the field in your own time. This will usually also involve chasing up other papers/books that might be referenced in the literature you are initially given. Subject to our approval, you may also choose to study a different topic in applied mathematics. **In particular**, if you know already what your **summer project** will be on (or who it will be with), it might be a good opportunity to start studying the **background literature** in the chosen field. (In this case we would advise you to speak to your potential project supervisor about a suitable paper/book to study.) In addition, there will be workshops on

- *How to give a good talk?*
- *How to write a good scientific paper?*
- *Critical analysis*

We will also offer drop-in sessions during this period where you can come with any questions about your specific topic, or you can simply email us of course.

Student Presentations (Weeks 10-11). Each student will have to give a 25 minute presentation on their topic. Your talks should be no longer than 20 minutes to allow for 5 minutes of questions at the end of the presentation. More guidance on how to prepare your talk will be given in Weeks 6-9.

Schedule of Classes

There is no strict weekly routine for this course. Much of the learning will be through self-study. However, there are three timetabled classes per week and we will meet usually at least once a week:

Wednesday	9.15am	in 8W2.29	Friday	2.15pm	in 8W2.21
Thursday	2.15pm	in 8W2.21			

Assessment scheme

Report on your chosen topic aimed at your peers.	[50%]
Seminar Presentation on your chosen topic in class.	[30%]
Peer Review (Critical Analysis) of reports and presentation.	[20%]

Resources

There will be a course webpage and you will find on it lecture notes, handouts, useful links etc. Relevant/suitable literature on each individual topic will be specified where appropriate and lists with suitable papers/books to choose from will be made available.

We hope you will enjoy the course. If you have any problems please do not hesitate to see us at the end of a lecture or email us.