MSc in Applicable Mathematics – 2022/23

**Notice Regarding MA407 Algorithms and Computation and
MA421 Topics in Algorithms**

Dear incoming MSc in Applicable Mathematics Student

In the MSc in Applicable Mathematics regulations you are required to take at least one course in **MA407 Algorithms and Computation** or **MA421 Topics in Algorithms**. This document provides information on the following two aspects of this option choice:

1. While MA421 builds on MA407, it is possible for students with sufficient prior knowledge in programming and the theory of algorithms and data structures to take MA421 without taking MA407.

2. For students without any or only very limited prior programming experience, some preparation for MA407 is necessary.

1. Prerequisites for MA421 Topics in Algorithms

If you have a sufficiently strong background in Computer Science, you might consider taking only the advanced course MA421 and not the introductory MA407. In particular, if you have substantial programming experience in Python **and** you have already learned the following topics (which are covered in MA407), then **MA407 is not suitable for you**: running time analysis, correctness of algorithms, sorting algorithms, dynamic data structures (such as linked lists, stacks, binary search trees), some fundamental algorithm design paradigms (such as recursion, dynamic programming, and greedy algorithms).

MA421 will assume knowledge of these topics. In addition, it will assume sufficient knowledge of the programming language Python, which is also taught in MA407. If you have little or no experience in Python, it is your responsibility to prepare for MA421 by learning Python. To this end, note that we only use basic Python functionality in these two courses. In general, we try to use a minimum of Python libraries. If you know how to implement a binary search tree in Python (without using libraries), then your Python proficiency should be sufficient for MA421.

If you want to take MA421 but not MA407 you need to get the permission of the MA421 lecturer (Professor Konrad Swanepoel). He can also give you further advice on how to prepare for MA421.

Any student taking MA407 can take MA421 to get a deeper understanding of the subject of algorithms.

2. **Preparing for MA407 Algorithms and Computation**

The course MA407 **Algorithms and Computation** for the MSc in Applicable Mathematics includes as an integral part programming in the computer language Python. An introduction to programming in Python is given in a series of pre-sessional classes and an online module provided by the Digital Skills Lab at LSE. However, this introduction is necessarily rapid. So, students who have never done any programming may easily fall behind. (In fact, MSc students from previous years experienced this as a major difficulty.) For that reason, if you do not have any or have only very little programming experience, please take some time to prepare for the course and learn some basics with the following resources

- The Python beginner guide at

  https://www.python.org/about/gettingstarted/

  gives you a good introduction to Python and many pointers for further exploration. Using the instructions linked from this page, you can download, install and start using Python on your own computer (if you have not already set up for it). You are encouraged to do so.

- The brief tutorial at

  https://docs.python.org/3/tutorial/

  presents many of the Python concepts and constructs that we will use in the course. Going through the first four sections (up to and including *More Control Flow Tools*) should give adequate preparation for the beginning of the course. If you do not have prior experience with Python, please make sure to try writing and running Python code that you see in the tutorials and/or Python code that you write on your own for some simple exercises.

Best wishes,

Dr Tugkan Batu (Lecturer for MA407) and
Professor Konrad Swanepoel (Lecturer for MA421)