Approximation of Functions

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Michaelmas Term 2018
Prof. Nick Trefethen
Numerical Analysis Group, Mathematical Institute
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This Course

This course is aimed at Part C and OMMS (4th year) Mathematics students (C6.3) and also students in the MSc in Mathematical Modelling and Scientific Computing. It presents the foundations on which all of numerical mathematics is built.

Instructor, tutor, and TA

Nick Trefethen, Wiles S2.27, 615317, `trefethen@maths.ox.ac.uk`. To speak with me, it's best to make an appointment by contacting me directly by email. The tutor is Vadim Kaushansky (`vadim.kaushansky@maths.ox.ac.uk`) and the TA is Aili Shao (`aili.shao@maths.ox.ac.uk`).

Textbook

The course will be closely tied to my textbook *Approximation Theory and Approximation Practice,* SIAM 2013, `http://www.maths.ox.ac.uk/chebfun/ATAP/` (the first six chapters are online at this web site). All students are required to use this book. Copies are available for £20 in the first two lectures. (SIAM charges $37.45 even with the SIAM member discount.)

Lectures

There will be 16 lectures in the Andrew Wiles Building: 9:00–10:00 Wednesdays and Thursdays in L4. If you want to learn this material, it is important to attend all the lectures.

The first week

The material for the first week of the course is that of Chapters 1–3 of the textbook. Unfortunately, the first week will be irregular since I am out of town; TAs Aili Shao and Vadim Kaushansky will be in charge. A video of me lecturing on this material can be found as Lecture 1 at `https://people/maths.ox.ac.uk/trefethen/atapvideos.html`.

Problem sheets and classes for Part C and OMMS students

There will be four 90-minute classes (`https://minerva.maths.ox.ac.uk/perl/classlists.pl`):

      Class 1: Week 2, Wed 17 Oct in C1. 11:00–11:45 surnames A–M, 11:45–12:30 N–Z (with TA)
      Class 2: Week 5, Wed 7 Nov 11:00-12:30 in L6 (with tutor)
      Class 3: Week 7, Wed 21 Nov 11:00–12:30 in L6 (with tutor)
      Class 4: Week 1 of Hilary Term, TBA (with tutor)

For each class, a problem sheet will be due before 1:00 on the previous Monday (Wiles mezzanine).

      Due Mon 15 Oct: 1.3, 2.1, 2.2, 2.4, 2.5, 3.5, 3.9 (exercises from the textbook)
      Due Mon 5 Nov: TBA
      Due Mon 19 Nov: TBA
      Due TBA: TBA

Assessment

For Part C and OMMS students, by exam in Trinity Term. For MSc MMSC students, by Special Topic, due Monday week 1, Hilary Term. There is great flexibility of topics you may choose.

Matlab and Chebfun

We will make constant use of Chebfun (`www.chebfun.org`), which is built on Matlab. It is not possible to understand this course fully without participating in this side of things. Accordingly, each problem sheet contains a mix of theory and computation. The exam will involve no Matlab or Chebfun, so in theory one could get away with paying no attention to computing, but that's unlikely to be true in practice, for your understanding of the material will be shallow.

Access to MATLAB and Chebfun

Matlab is available from `https://register.it.ox.ac.uk/self/software`. To get Chebfun, go to `www.chebfun.org` and click on Download for instructions.

Course web page

`https://courses.maths.ox.ac.uk/node/37008`.