Special functions: from Combinatorics to Calculus

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About me.

I am a Professor of Mathematics at University of Oxford and a Tutorial Fellow at Somerville College since 2014.

Figure: Radcliffe Camera and All Souls College - Oxford

Before that, I was

- a C.L.E. Moore Instructor at M.I.T. (2004–2007), and
- an Assistant and Associate Professor at University of Utah (2007–2014).

I was an undergraduate student in Maths at Babeș-Bolyai University in Cluj, Romania, then went to Cornell University, where I obtained a Ph.D. in Mathematics in 2004.

Figure: McGraw Tower - Cornell

My research is Group Theory and Representation Theory. Representation theory is the natural mathematical concept for studying symmetries, and, in its modern form, lies at the interface of algebra, algebraic geometry, number theory.

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The aim of the course is to show several applications of Calculus to combinatorics, (classical) number theory, and probability. The syllabus includes:

- combinatorics, power sums, Bernoulli polynomials, the Binomial Theorem;
- infinite series, power series, Taylor series, generating functions;
- Bernoulli numbers and the zeta function;
- the Gamma function, integral definition, basic properties;
- Double integrals, Jacobians;
- the probability integral, normal distribution and the Central Limit Theorem;
- other applications of the Gamma function.

The problem sheets (homework) will have two parts:

- Part A: mostly multiple choice questions that you should turn in for marking;
- Part B: more complex questions that you should not turn in, but their solutions will be discussed in Prof Lei Wu's sessions and/or the TA class.

There will be a midterm (week 5) and a final exam (week 10). The structure of the tests will be communicated later.

I hope you will enjoy this course!