Introduction to BEng/MEng JMC courses

Dr. Jeremy Bradley
JMC Course Director
## Timetable for Today

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:10 - 2:20</td>
<td>Intro to BEng/MEng JMC courses by Jeremy Bradley</td>
</tr>
<tr>
<td>2:20 - 2:30</td>
<td>Introduction to Maths component</td>
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<tr>
<td>2:30 - 4:50</td>
<td>Interviews</td>
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<tr>
<td></td>
<td>Tour Department and College Student Demonstration</td>
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<td></td>
<td>Refreshments will be served from 1:30 in room 344</td>
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</tbody>
</table>
Purpose of the Interview Day

For us to answer questions about our courses...

...and for you to get an impression of student life here
The JMC Team

- **Emma McCoy**
  - Deputy Head of Mathematics

- **Jonathan Mestel**
  - Maths Director of Studies

- **Alessandra Russo**
  - JMC Exam Coordinator

- **Tony Field**
  - Computing Director of Studies

- **Margaret Cunningham**
  - Computing Senior Tutor

Jeremy Bradley - JMC Course Director
Degrees We Offer

Joint Maths and Computing (JMC) undergraduate degrees

MEng in JMC: 4 years

- MEng in Mathematics and Computer Science - GG41
- MEng in Mathematics and Computer Science (Pure Maths and Computational Logic) - IG11
- MEng in Mathematics and Computer Science (Computational Statistics) - GI43

BEng in JMC: 3 Years

- BEng in Mathematics and Computer Science - GG14
Degree Structure – BEng and MEng

• Common 1st year
• 2nd year: flexibility and range of options depending on MEng/BEng degree
• Projects and laboratory work in Computing
  – Individual
  – Group

• Each course modules has
  – lectures
  – laboratory work
  – Tutorial work
  – Assessment
    • Exams
    • Courseworks
Year Structure

Years 1 & 2
– Terms 1 & 2
  • Core courses
  • Option courses
  • Assessed Labs
– Term 3
  • Examinations
  • Lab & Projects

Year 3
– Terms 1 & 2
  • Option courses
  • Projects
– Term 3
  • Examinations
  • Lab
  • Projects

Year 4
– Terms 1 & 2
  • Option courses
  • Individual project
– Term 3
  • Individual project
  • Examinations
Year 1 Topics – BEng and MEng

Computing

• Programming
  – Haskell
  – Java

• Computer Science
  – Architecture
  – Reasoning about Programs
  – Logic

• Laboratory

• Matlab group project

Mathematics

• Foundations
• Geometry
• Linear Algebra
• Mathematical Methods (Calculus)
• Pure Maths (Analysis and Algebra)
Tutoring

• Personal Tutoring
  – Personal Programming Tutor
  – Personal Logic/Reasoning Tutor

• Tutorial Classes
  – Lecturers
  – Teaching Assistants
  – Research Assistants
Year 2 Topics – BEng and MEng

Computing
• Software Engineering – Design
• Software Engineering – Algorithms
• Databases
• Prolog
• Operating Systems
• Complexity and computability
• Compilers
• Artificial Intelligence
• Concurrency
• Laboratory
• Group project

Mathematics
• Pure Mathematics
  – Algebra*, Topology, Analysis
• Numerical Analysis
• Probability, Statistics and Modelling
• Differential equations
• Practical numerical algorithms
Year 3 Topics – BEng

• Options:
  Students choose at least 2 and up to 5 from Computing and Maths topics, with a maximum of 7 courses in total.

• Computing Group Project

• Comp/Maths Individual Project

• Humanities & Management

+ Lots of Maths Options
Year 3 Topics – MEng

• Options:
  Students choose at least 2 and up to 6 from Computing and Maths topics, with a maximum of 8 courses in total.

• Computing Group Project

• Humanities & Management

• Industrial Placement

+ Lots of Maths Options

• Databases
• Software engineering
• Graphics
• Advances in artificial intelligence
• Machine Learning
• Logic Programming
• Simulation & Modeling
• Performance Analysis
• Computational Finance
• Distributed Systems
• Advanced computer architecture
• Introduction to Bioinformatics
• Operations research
• Computational finance
• Type systems for programming languages
Year 4 Topics – MEng

Students choose 7 options – at least 2 from each department

- Parallel Algorithms
- Software Engineering Environments
- Economics and Law
- Network Security
- Natural Language Processing
- Models of Concurrent Computation
- Advanced Operations Research
- Multi-agent Systems
- Knowledge Representation
- Complexity
- Distributed Algorithms
- Advanced Graphics/Visualization
- Computer Vision

+ Advanced Issues in Object Oriented Programming
- Automated Reasoning
- Intelligent Data and Probabilistic Inference
- Modal and Temporal Logic
- Program Analysis
- Computing for Optimal Decisions
- Grid Computing
+ Lots of Advanced Maths Options
Individual Project in Maths or Computing

• Great opportunity
  – Taste life as a researcher
  – Working to deadlines

• Work in one of our research groups
  – Using all the facilities

• Produce software or scientific results
  – Of real value to our research

Visit the distinguished projects page (250,000 downloads so far)
http://www.doc.ic.ac.uk/go/distinguished
Working Hard Has Rewards

• 2005: JMC4 student Paul Bilokon winner of the British Computer Society Award for “Student Making Best Use of Information Technology” at the Science Engineering and Technology Student of the Year Awards.

• 2006: JMC3 student Gabriel Keeble-Gagnere winner of Science Engineering and Technology Student of the Year Awards, for Simple groups.

• 2007: JMC4 student Richard Hayden winner of Science Engineering and Technology Student of the Year Awards, for Best Computational Science student.
Mathematics Department at Imperial College

- World Renowned Mathematicians:
  30 Professors, 50 other academics
- Sections:
  Pure Mathematics
  Applied Mathematics and Mathematical Physics (AMMP)
  Statistics
  Mathematical Finance
- Research Excellence
- Teaching Excellence
- Course objective
  To encourage enthusiasm for the subject as a discipline that is of value in its own right...
Research Activities

Applied Analysis & Computation Group
Biomathematical Sciences Groups
Dynamical Systems at Imperial College (European Science Foundation)
Fluid Dynamics Group
Geometry at Imperial College London
Integrable Systems Group
Mathematical Physics Group
METRIC: Electronic Learning Materials in Mathematics
JMC Course objectives

• Mathematics with applications in computer science:
  - pure mathematics
  - statistics
  - numerical analysis
  - logic
Course structure: Year 1

Mathematics courses:

• Geometry and Linear Algebra
• Mathematical Methods
• Foundations
• Pure Maths (Algebra and Analysis)

Aims:

• Develop the language of mathematics
• Pure Mathematics grounding
Course Structure: Year 2

• Compulsory Algebra course
• Three courses from:
  – Probability and Statistics I
  – Real Analysis
  – Differential Equations II
  – Orthogonality
  – Complex Analysis
  – Metric Spaces and Toplogy
  – Statistical Modelling
Course Structure: Year 3/4

• Of the 7 courses at least 2 from over 30 mathematics options – ranging from:
  Galois theory to
  Statistical modelling in finance;
  Biostatistics to Algebraic Number Theory

• If on MEng:
  3rd year: group Computing projects
  4th year: individual project in either Maths or Computing

• If on BEng:
  individual project in either Computing or Mathematics
Advantages of the JMC course at Imperial College

• Vertical slice through both disciplines:
  reach advanced level in both
  possible to go on to postgraduate study in either discipline

• Excellent job opportunities
  highly remunerated jobs in many fields  from IT consultancy to
  finance

• London
  great place to live and study
Thank you for coming