Junior Demonstrator Briefing

Tim Davies & Ben Jenkins
(Slides Adapted From Dr Lewys Jones)
Overview

• Undergraduate labs in Materials Science
  – Important people
  – Purpose,
  – Schedules,
  – Groupings,
  – Topics.

• The role of the Junior Demonstrator
  – What it is,
  – What it isn’t.

• Some advice

• Possible UG lab scenarios
Ice Breaker

Introduce yourself (not which group you work in), your teaching experience, and one weird fact
The Purpose of UG Labs

• Labs provide essential training in practical scientific skills, conducting work independently from written instructions and report writing

• Labs support the academic lecture course series throughout the year

• Labs are EXAMINED coursework towards either Preliminary of Final exams
<table>
<thead>
<tr>
<th>Year</th>
<th>Module</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MS1 – Structure of Materials</td>
<td>Written Summer ‘Prelims’ Exams 400 / 500 marks</td>
</tr>
<tr>
<td></td>
<td>MS2 – Properties of Materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS3 – Transforming Materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MMES - Maths for Materials and Earth Scientists</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Practical Labs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Crystallography Classes</td>
<td>Written assessment during classes 50 / 500 marks</td>
</tr>
<tr>
<td>2</td>
<td>GP1 - Structure and Transformation of Materials</td>
<td>Written Summer ‘Finals’ Exams at end of 3rd year 400 / 1200 marks</td>
</tr>
<tr>
<td></td>
<td>GP2 - Electronic Properties of Materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GP3 - Mechanical Properties of Materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GP4 - Engineering Applications of Materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Practical Labs</strong></td>
<td>Written assessment of lab reports 60 / 1200 marks</td>
</tr>
<tr>
<td></td>
<td>Industrial Visits, Business Module</td>
<td>Written assessment of reports 40 / 1200 marks</td>
</tr>
<tr>
<td>3</td>
<td>OP1 – Materials Options Paper 1</td>
<td>Written Summer ‘Finals’ Exams at end of 3rd year 200 / 1200 marks</td>
</tr>
<tr>
<td></td>
<td>OP2 – Materials Options Paper 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Team Design Project</td>
<td>Written assessment of reports 50 / 1200 marks</td>
</tr>
<tr>
<td></td>
<td>Characterisation / Modelling Module</td>
<td>Written assessment of reports 50 / 1200 marks</td>
</tr>
<tr>
<td>4</td>
<td>Masters (Part II) Project</td>
<td>Written assessment of thesis 400 / 1200 marks</td>
</tr>
</tbody>
</table>
Important People

- Dr Keyna O'Reilly – Practical Class Coordinator
- Paula Topping – Practical Class Technician
- Senior Demonstrators
- The Students (≈30-35 each year)
- Other Junior Demonstrators
- Paul Warren etc. – Departmental IT
  – itsupport@materials.ox.ac.uk
UG Labs Schedule

• First year UGs:
  – Thursday & Friday 14:00 – 17:00 alternate weeks (MT & HT)*
    *Excluding some introductory labs in MTwk1 & MTwk2.
  – PLUS two afternoons (assorted days) in the first half of TT.

• Second year UGs:
  – Monday – Wednesday afternoons alternate weeks*
    *Except Trinity term which has a special timetable.

• Junior demonstrators should aim to arrive at least 10 minutes before the start of labs,

• Labs may not happen in the same order as previous years.
UG Lab Groups

- Students work in groups of two or three
- Generally grouped by college but not always
- Designed to encourage and teach teamwork
- Will undoubtedly include a mixture of abilities, personalities, approaches, genders
UG Lab Topics – Year 1

- Practical 1P1a  Computing
- Practical 1P1b  Microscopy
- Practical 1P2  Young's Modulus and Stress Analysis
- Practical 1P3  Electrode Potentials
- Practical 1P4  Energy Levels and Band Gaps
- Practical 1P5  Bubble Raft
- Practical 1P6  Thermal Analysis
- Practical 1P7  Fabrication and Tensile Testing
- Practical 1P8  Metallography
- Practical 1P9  Polymers - Molecular weight effects
- Practical 1P10  Introduction to MatLab & Labview

http://www.materials.ox.ac.uk/teaching/ug/ugpracticals.html
UG Lab Topics – Year 2

- Practical 2P1  Diffusion
- Practical 2P2  Dislocations and Plasticity
- Practical 2P3  Casting
- Practical 2P4  Introduction to AFM Analysis
- Practical 2P5  SEM and Fracture
- Practical 2P6  Extrusion
- Practical 2P7  Corrosion
- Practical 2P8  Transmission Electron Microscopy
- Practical 2P9  Steels
- Practical 2P10  Materials Selection
- Practical 2P11  Mechanical properties of polymers
- Practical 2P12  Semiconductor Devices

http://www.materials.ox.ac.uk/teaching/ug/ugpracticals.html
Group Exercises

Split into (≈4) groups:

What makes the best teachers/educators effective?

Think of a couple of examples of bad teaching

In your experience, what makes a good/bad demonstrator?
The Role of the Senior Demonstrator

- To write lab handout for the students to follow
- To introduce and explain the relevance of the lab
- To tell the students the key deliverables they are looking for
- To instruct the JDs if there are special themes they want highlighted by the students
- To be around in the labs to answer academic questions, around an average of one hour per day (not fixed)
- To read and mark the written reports
  - The marking method is now displayed on a chart outside the labs.
The Role of the Junior Demonstrator is... (1)

- To familiarise themselves with the practical and the equipment in advance of the lab session, including reading the online handout
- (For new JDs) doing a practice run of the lab
- To oversee delivering the SDs requirements
- To assist the PCT in encouraging safe, respectful and professional behaviour in the labs
- To assist the PCT in concluding the labs in a timely fashion
- To answer reasonable questions from students
What are reasonable questions?

• “What should we do first?”

• “Is one measurement enough?”

• “We are unsure if we have set up our testing equipment properly, please could you check?”

• “Do these results look right to you?”

• What should you do if you are asked a question that you don’t know the answer to?
The Role of the Junior Demonstrator is... (2)

- To assist students in becoming effective experimental scientists with:
  - proper lab discipline, behaviour and time management
  - effective team-work and communication skills
  - correct use of lab notebooks (not examined but available to the examiners for inspection)

- To assist students with experimental equipment

- To develop themselves in their communication and teaching skills.
The Role of the Junior Demonstrator is not...

• To give students the ‘answers’ to the lab

• To do any work for the students or tell the students how to approach the tasks

• To tell them if they’ve gotten something ‘right’ or ‘wrong’

• To earn some quick money by baby-sitting a group of young-adults / to catch-up on reading
A few words of advice

• Make sure to spend time getting familiar with your practical(s)
  – It is much easier to deal with problems if you understand the practical and apparatus!
  – You get paid for the training time!
• Be proactive and talk to all the groups regularly
  – This often helps to identify problems before they arise
• Enjoy yourself!
Possible UG Lab Scenarios (1)

- A student doesn’t understand the handout’s instructions
- You see someone copying / cheating
- An accident/near miss occurs
- A student is in the IT room completing tute-work for a deadline
- A student leaves the lab unannounced to go smoke / to the vending machines
- You see a student about to do something without the required PPE
Real Scenario (1)

• You are approaching the end of day two of a three day lab. You have concerns that one group will struggle to finish on time. They have taken multiple measurements for 2 out of 5 samples, but have not yet taken any measurements on the other three samples. They seem more concerned with taking multiple measurements for each sample.

• What would you do?
Possible UG Lab Scenarios (2)

- One person in a group is doing no work
- One person in a group is doing all the work
- A student is checking emails / listening to music / playing with a smart-phone in the lab
- You think a student / group are rushing their work just to leave early
- Several groups in the lab all need help at the same time
- You see a group doing the practical/analysing their data incorrectly
Real Scenario (2)

During the first week of your practical, one of the sets of equipment for the second half of the practical will not achieve enough signal for a group to get data.

What would you do:
A) If there is lots of time left?
B) If time pressure is such that the group can’t use someone else’s apparatus after them?
C) If the equipment is not fixed for the next week?
Discussion Time