Junior Demonstrator Workshop

Diana Passmore & Bradley Young

(slides adapted from many previous TA’s: Laura Wheatley, Mike Goode, Dr Ben Jenkins and Megan Carter, to name a few!)
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

What is your best memory (or worst) of your undergraduate labs?
The Purpose of UG Labs

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

• Labs support the academic lecture course series throughout the year

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

• Prof Peter Nellist – Practical Class Organiser (PCO)

• Diana Passmore – Practical Class Technician (PCT)

• Academic Lead

• Senior Demonstrators (SD’s)

• Deputy SD’s

• Junior Demonstrators/Teaching Assistants (JD’s/TA’s)

• The Students (≈38-48 each year)

• Education Support Team
  – Philippa Moss, Ellie Thornton etc.
UG Labs Schedule

14:00 – 17:00

- First year (2 days):
  - Thursday & Friday (6hrs/wk)
  - Excluding some introductory labs in MT wk1-2
  - Weeks 1-4 TT

- Second year (3 days):
  - Monday – Wednesday (9hrs/wk)
  - Special timetable in TT

- Ensure you are available for the whole duration (each afternoon) of the practical

- TA’s should aim to arrive at least 10 minutes before the start of labs

- Practical timetable is reviewed annually
UG Lab Groups

• Student’s work in groups of 2 – 3

• Generally grouped by college but not always

• Designed to encourage and teach

• Will undoubtedly include a mixture of abilities, personalities, approaches, genders
UG Lab Topics – Year 1

- Practical 1P1a Intro to Computing
- Practical 1P1b Intro to Microscopy
- Practical 1P2 Intro to LabVIEW
- Practical 1P3 Young’s Modulus & Stress Analysis
- Practical 1P4 Metallography
- Practical 1P5 Polymers - Molecular Weight Effects
- Practical 1P6 Thermal Analysis
- Practical 1P7 Bubble Raft
- Practical 1P8 Electrode Potentials
- Practical 1P9 Energy Levels and Band Gaps
- Practical 1P10 Fabrication & Tensile Testing

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

- Practical 2P1 Materials Selection
- Practical 2P2 Steels
- Practical 2P3 Extrusion
- Practical 2P4 Casting
- Practical 2P5 Diffusion
- Practical 2P6 Dislocations and Plasticity
- Practical 2P7 Corrosion
- Practical 2P8 Mechanical Properties of Polymers
- Practical 2P9 XRD Detective
- Practical 2P10 SEM and Fracture
- Practical 2P11 Transmission Electron Microscopy (TEM)
- Practical 2P12 Semiconductor Devices

http://www.materials.ox.ac.uk/teaching/ug/ugpracticals.html
UG Practical Assessments

• Lab Notebook:
  – completed during the practical hours
  – stay in the lab
  – concise information about what happened in lab
  – assessment type for majority of practicals
  – marked out of 3 (by SD)

• Lab Report:
  – 3 weeks to complete (at home)
  – in the form of an Acta Materialia article
  – usually 1x report per term
  – marked out of 13 (by SD)

• Other:
  – introductory 1st year labs not assessed (1P1a, 1P1b, 1P2)
  – poster presentation (2P1 Material Selection)
ACTIVITY

What makes the best teachers/educators effective?

Think of a couple of examples of good & bad teaching…
APPLICATION

How can one apply certain skills to make them an effective demonstrator?

(In your experience, what makes a good/bad demonstrator?)
The Role of the SD

- To write/update **lab script** 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 TA’s if there are **special themes** they want highlighted by the students
- To be around in the labs to answer **academic questions**, ~ 1 hour per day (not fixed)
- To read and **mark** the lab notebooks/reports
The Role of the JD/TA is... (1)

- To **familiarise** themselves with the practical (practical script, equipment, frequent problems, data analysis)

- (For new JDs) complete **the lab and produce a data set** – paid!

- Assist PCT (Diana) to:
  - set up/down each practical
  - encouraging safe, respectful and professional behaviour in the labs
  - concluding the labs in a timely fashion

- To **answer reasonable questions** from students
<table>
<thead>
<tr>
<th>Reasonable (R)</th>
<th>Unreasonable (UR)</th>
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</thead>
<tbody>
<tr>
<td>1. “What should we do first?”</td>
<td>R</td>
</tr>
<tr>
<td>2. “How many measurements should we take?”</td>
<td>UR</td>
</tr>
<tr>
<td>3. “We are unsure if we have set up our testing equipment properly, please could you check?”</td>
<td>R</td>
</tr>
<tr>
<td>1. “Do these results look right to you?”</td>
<td>R</td>
</tr>
<tr>
<td>2. “What is the point of this lab?”</td>
<td>R</td>
</tr>
<tr>
<td>3. “Can you please do this (part of the experiment) for me while I write in my lab notebook?”</td>
<td>UR</td>
</tr>
<tr>
<td>1. “What is the answer for this part of the practical?”</td>
<td>UR</td>
</tr>
<tr>
<td>2. “Can I leave early as I have to attend a sports match?”</td>
<td>UR</td>
</tr>
</tbody>
</table>

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

- To assist student in becoming effective experimental scientists with:
  - proper lab discipline, **behaviour** and time management
  - effective **team-work** and communication skills
  - correct use of lab notebooks (most examined and available to the examiners for inspection)
- To assist students with experimental **equipment**
- To develop themselves in their **communication and teaching** skills.

Comply with the rules of the lab!
The Role of the JD/TA 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, apparatus and data analysis!
  – 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!
If interested in becoming a TA, you’ll be asked to “officially” apply soon
You’ll need to check the current practicals list and indicate your preferred ones
You’ll need your supervisor’s approval to be a TA, please check it with him/her before applying
Once you have applied, you’ll be in my database and I’ll start calling you as vacancies in the lab arise
If the vacancy is in any of the practicals you have prioritized, you’ll have more chances to be selected
You’ll be paid for the time you work (£15.15 per hour). This includes practical preparation, practical themselves and any other support your might provide that is approved by me

And, finally, if you are selected but your performance is not satisfactory, I will have to find a replacement. Students will provide feedback on your performance, as well as Diana.
Application Process

- Application form + reference from supervisor

- You will receive:
  - application form
  - job description
  - practical schedules
  - practical's that are available for selection

Due Date: 5pm Friday 25th November 2022
Thank you for listening

ANY QUESTIONS?
LUNCH!
LAB SCENARIOS (1)

- A student doesn’t understand the handout’s instructions
- You see someone copying from another group
- You notice a beaker of acetone on a turned-on hot plate
- A student is in the IT room completing a problem sheet for a deadline
- You see a student about to pick something up out of acid with their fingers
- Several groups in the lab all need help at the same time
LAB SCENARIOS (2)

- One person in a group is doing no work (or all the work)
- A student is playing with a smart-phone in the lab
- A student leaves the lab to go to the café
- You think a group are rushing their work to leave early
- You see a group plotting the wrong graph when analysing their data
- Two students are spraying water at each other with pipettes
- You spot someone polishing without safety specs
- The furnace for one of the groups isn’t working
Real Scenario

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?