LECTURES & SUPERVISIONS

- Preliminaries
- People
- Lectures
- Examples Papers
- Supervisions

IMPOSTOR PHENOMENON

Common amongst competent people (especially academics) who are convinced that they are frauds and don't deserve the success they have achieved

Proof of success is dismissed as luck, timing, or of deceiving others into thinking that you're more intelligent than you are

Destructive to self-esteem and confidence:

It's not true! You do deserve to be here!

STUDY SKILLS

- You are here in Cambridge University:

  → you are intelligent and a high achiever
  → you already have good study skills

- *But* this course is very different from being taught in a classroom
- So *you need to adapt your skills to the course, and learn some new techniques*

STUDY SKILLS

- The course is
  - Fast, packed with new ideas
  - Designed to stretch you
- You will find you're capable of more than you'd ever imagined
- But you have to work at it!

PERSONAL RESPONSIBILITY

- You are treated as adults:

  → responsible for your own *study and learning*

  → responsible for *managing your time*
  (lectures, labs, supervisions, sports, social life...)

- Be honest:
  with your Director of Studies, supervisors and yourself

- If you don't work properly, you are the one who will suffer – with stress, and low exam grades

THE ENGINEERING COURSE

- Is highly structured:
  - ⇒ *Lecture timetable*
  - ⇒ *Examples paper schedule*
  - ⇒ *Coursework rota*
  - ⇒ Supervision schedule

- If you turn up to everything and do the work you are set, you should be OK

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Professor Richard Prager
Head of Department

"LECTURERS"

- Members of the Department's Academic/Teaching Staff:

⇒ Professors

⇒ Readers

⇒ Senior Lecturers

⇒ Lecturers

⇒ Assistant Lecturers

⇒ Design Engineers

⇒ Computer Officers

- Often a Fellow at a College

DIRECTOR OF STUDIES: “DoS”

- College position: responsible for your academic well-being, progress and development

- Arranges and oversees your supervisions
- Advises on course choices, jobs etc., and provides academic references
- Use your DoS when they ask for ‘Tutor’

- For *pastoral matters* (health, finance etc), see your *Tutor*.

SUPERVISORS

- Supervisions organised by DoS in 1st & 2nd year, and by Department in 3rd year
- None on 4th year courses, only for Project

- Supervisors can be:
  - ⇒ Your Director of Studies
  - ⇒ A Fellow at your College, or another College
  - ⇒ A post-doc researcher, or graduate student
- Different supervisors cover one or more parts of the course, e.g. Maths, Electrical, Structures, Materials....

DEMONSTRATORS

- Labs organised by Department

- Demonstrators can be:
  - $\Rightarrow$ Lecturers
  - $\Rightarrow$ Technical staff
  - $\Rightarrow$ A post-doc researcher, or graduate student

LECTURES I

- Approx. 10 per week, mostly in LT0 in 1st year
- *Main purpose*: to get information and techniques across to students

- First year class large (300+): limited opportunity for interaction with the lecturer during lectures
- Interaction/feedback is provided during supervisions

LECTURES II

Should you go to lectures?

- Attendance is not monitored – no one is going to force you to get out of bed and turn up

But note:

- Lectures are the best way of acquiring the knowledge and techniques that you need
- The lecturer will have organised and customised the information that they know is important
- *Going to lectures is a very good use of your time*

LECTURE NOTES I

- Most lecturers provide handouts, with key gaps to fill in during the lecture, e.g. worked examples
- You don’t have to write everything down and make your own notes

- *Advantage*: you can listen more carefully, rather than writing frantically,
- *Disadvantage*: you may find it more difficult to concentrate.

LECTURE NOTES II

Solution: listen actively –

$\Rightarrow$ Use a highlighting pen to emphasise key points

$\Rightarrow$ Fill in all the gaps, and keep up with the lecturer

$\Rightarrow$ Highlight things you don't understand, to follow up later when there is more time to think

Follow up by: talking with other students, or supervisors, or looking on the web, or using a textbook. Then try answering questions (examples).

LECTURE NOTES III

- Good practice:
  - Go through the notes from each lecture later that day, tidying up loose ends while you remember
  - Review the notes on each course the evening before the next lecture
- Essential: review your notes *before* you attempt Examples Paper questions
- *Lecture notes are condensed, targeted resources for your course: use them.*

FEEDBACK ON LECTURES

- Lecturers appreciate *constructive* feedback

- For presentational problems, tell the lecturer!
- Use the (anonymous) *Fast Feedback facility* to comment on clarity, content, pace, etc.

- Fill in *Lecture Questionnaires* (if issued)
- Do the *On-line Survey* as soon as each course ends
- Vote in the *Best Lecturer* competition

- Contact *Staff-Student Joint Committee (SSJC)*

Staff-Student Joint Committee (SSJC)

- Elected student reps at the main departmental committees, including SSJC,
- College reps pass feedback to SSJC Members

We do take this very seriously. The SSJC discussions inform the evolution of the course and facilities.

- Revamp IA and IB computing
- Change IIA lab assessments
- Planned changes to the Fast Feedback system

Please consider joining the team of reps!

EXAMPLES PAPERS

- Preliminaries
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Engineering **FIRST YEAR**

Part IA Paper 2: Structures and Materials

MATERIALS

Examples Paper 1 – Elastic Deformation and Design

Straightforward questions are marked with a †

Tripos standard questions are marked with a *

You will need to look up data in the Materials Databook, and use the Cambridge Engineering Selector (CES) software.

Elastic Stress and Strain

†1. Draw diagrams to define (i) tensile strain e, (ii) shear strain γ, (iii) Poisson's ratio ν, in the elastic straining of a solid.

†2. (a) Figure 1 shows a typical element of material with Young's modulus E and Poisson's ratio ν, which is subjected to normal stresses σ_1, σ_2 and σ_3. Derive simultaneous equations for the strain in each direction e_1, e_2 and e_3, as a function of these stresses.

(b) Define the dilatation, and derive an expression for the dilatation for a general state of strain e_1, e_2 and e_3 (assuming that the strains are small).

(c) Define the bulk modulus, K, and write down the expression relating K to E and ν (from the Databook), explaining how it is derived. Compare K and E for metals ($\nu = 0.3$) and for rubber $\nu = 0.5$? What does the value for rubber mean physically?

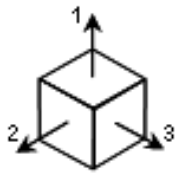

Figure 1

EXAMPLES PAPERS

- Issued in parallel with lecture courses
  (on Wednesdays in 1st year)
- Typically 4-5 each fortnight; take 4-8 hrs each
- Your *main private study material*
  (supplemented with past exam (Tripos) papers)

- Questions are graded:
  - *straightforward* (†):
    reinforce concepts and practise techniques
  - *Tripos standard* (*):
    involve a problem-solving element

HOW TO TACKLE QUESTIONS I

DO

- Review your lecture notes first
- Know what's in the *Data Books*, and use them
- Keep a record of progress and *note any problems you have* – to ask your supervisor

- Persevere: you won't sail through every topic
- Help one another

  Collaboration is good! Teaching someone else is a great way to sharpen up your own understanding

HOW TO TACKLE QUESTIONS II

DON'T

- Look at the answer first (at the back of the paper)
- Spend too long on a single question (20-60 minutes maximum)
- Try to complete a whole paper in one sitting

- Give up on the rest of the paper just because you can't do one question
- Rely too much on *cribs* (see later), or your peers
- Just copy things out without understanding them

HOW TO TACKLE QUESTIONS III

- Interpreting/modelling the problem is often the first and most difficult part of hard questions
- Try to visualise the problem clearly:
  - $\Rightarrow$ Draw a large, clearly labelled diagram
  - $\Rightarrow$ Identify the physical principles involved
  - $\Rightarrow$ Plan and outline the steps in the solution

- Do not just hunt vaguely for an equation that seems to involve the right variables

IF YOU GET STUCK

- If you can't do a problem, it's because there's something you don't understand or know
- Try to work out what it is!
- Consult textbook (in CUED or College library)
- Web resources: but try to check accuracy…
- Ask:
  - $\Rightarrow$ Another student
  - $\Rightarrow$ Your supervisor
  - $\Rightarrow$ At an Examples Class
- Look at the crib (see later)

COLLABORATION, CHEATING AND PLAGIARISM

- Collaboration is good:
  → Working together to share knowledge and improve understanding
- Once you can do the work, complete it *on your own*

Anything you submit for credit must be your own work

- If you use bits of other peoples' work, you must *acknowledge* it (e.g. a diagram, someone else's data)
- If you don't, you are guilty of *plagiarism*
  → Submitting all or part of someone else's work under your name
- All forms of cheating are bad, and penalties are harsh

EXAMPLES CLASSES

- Organised by the Department:
  11.00 am on Wednesdays in 1st year
- One class (with the Lecturer) for each Examples Paper (see Schedule)

- A "safety net" to support supervisions – generally ask your supervisor first

Please sign-up for your examples classes!

No student registered = cancellation

CRIBS I

- *Cribs*: model answers to Examples Papers and Tripos exam papers

Released on Moodle after the examples class

- Tripos cribs (for 5 years) on CUED website

- *Only use cribs as a last resort* –
  beware, they can lead you to believe that you understand the material, when actually you don't !

CRIBS II

- Good practice:
  - Use the crib to give you hints:
    - ✓Cover it up; reveal the solution bit by bit
    - ✓Understand where *every* number or variable comes from in *every* equation or figure
    - ✓Stop reading the crib when you think you can proceed
    - ✓Try the problem again independently, some time later

- Do not just copy out the crib:
  - your supervisors already have it!

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SUPERVISIONS I

- Typically:
  - groups of two or three
  - two or three supervisions per week
  - one hour long
- Supervisions are for:
  - $\Rightarrow$ Sorting out problems from lectures, Examples Papers
  - $\Rightarrow$ Discussing coursework/design exercises
  - $\Rightarrow$ Going over past Tripos questions, exam technique etc.
  - $\Rightarrow$ Open-ended discussion about Engineering

SUPERVISIONS II

- Supervisions should be very interactive
- They are not lessons – you should drive them
- Can (initially) be a daunting experience:
  there is nowhere to hide…
  - Remember: supervisors are there to help you
  - It is no disgrace to admit that there are things you don't understand or questions you can't do
  - Almost everyone finds the course hard – it is designed to challenge you all.

SUPERVISIONS III

- It is totally counter-productive to (try to) mislead your supervisor about:
  - $\Rightarrow$ How much work you have or haven't done
  - $\Rightarrow$ How well you understand things
  - $\Rightarrow$ How well you have tackled Examples Papers etc.
- Experienced supervisors see through deception
- You suffer if your deception is successful

GOOD AND BAD SUPERVISIONS

Supervisor: How did you get on with this examples paper?

Student: I did it all!

Lazy supervisor: OK, go away, see you in two weeks!

Good supervisor: Then let's just explore question 4…
(which reveals that the students didn't fully understand what they were doing…)

IN A GOOD SUPERVISION

Supervisees (i.e. *you*):

- Consult supervision partner in advance about what to discuss;
- Arrive prepared with questions:

→ "Can we go over the concept of Virtual Work?"

→ "On Q6 I tried this method, but I'm out by a factor of …."

→ "I didn't do Chemistry at school, can you help me to understand …..?"

→ "I got stuck *at this point* in Q7 because I didn't know how to…"

→ "I need more practice solving differential equations"

→ "Can you recommend some past Tripos questions to try?"

IN A GOOD SUPERVISION

Supervisors steer the session, but get you talking:

→ “Most students find Q3 tricky. How did you get on with it?”

→ “How accurate is your answer using that graphical method? Is that appropriate for this branch of Engineering?”

→ “Why don’t you explain your method to the rest of us?”

→ “How does the roof of King’s College Chapel stay up? Have you been to look at it yet?!”

SUMMARY

The Cambridge course is demanding but should be rewarding. Approach it sensibly, and you'll be fine!

There is plenty of support available to you: just ask.

Be realistic: You (probably) can't be best at everything, but you can be good enough

Remember your successes! You *can* do this course!

ANY QUESTIONS?