

Mathematical Sciences induction for new lecturers, markers and tutors

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Outline

- Introduction: Ethos, Practical issues
- Tutorials
- Marking
- Lectures
- Setting homework and exams
- Other items: Mentoring, student feedback

Handouts: PGs yellow+white, UGs pink+white

Slides and handouts online at

<http://www.maths.dur.ac.uk/~dma0sfr/Training/>

Ethos and Expectations

Aims:

- To provide students with a research-led education in mathematics, training them as part of a community of professional practice.
 - ▶ Focus on teaching process, seeing mathematics as an approach to knowledge rather than a collection of results.
 - ▶ Tutorials and homework are essential: students learn by doing problems.
- To provide excellent learning opportunities for all students
 - ▶ Having respect for diversity and providing equality of opportunity.
 - ▶ Required to provide reasonable adjustments to address disabilities.
- To encourage student participation and help students to develop as independent learners.

Online handbook:

<http://www.dur.ac.uk/mathematical.sciences/teaching/handbook/>

Expectations of and for students:

[http://www.dur.ac.uk/\[...\]/handbook/department/expectations/](http://www.dur.ac.uk/[...]/handbook/department/expectations/)

Practical aspects: Sharry

- Markers:
 - ▶ Keep a note of the number of scripts marked
 - ▶ If the lecturer for whom you are marking is not satisfied with the standard of your marking then you will be relieved of it.
- Postgrads: It is essential that marks/attendance is entered into records as soon as possible. Instructions at http://www.maths.dur.ac.uk/compinfo/wiki/index.php/Records_Programme
Failure to make these entries promptly may well result in you being relieved of duties.
- Tutors and Markers: act as a team to resolve problems and if you need advice see Sharry

Tutorials

Aims of a tutorial:

- Help students resolve difficulties in understanding
- Increase their problem solving skills
- Develop communication skills in maths, ability to express an argument clearly and coherently
- Increase mathematical confidence
- Increase interest in mathematics
- Enable students to give feedback on their courses and how they are coping

Key points:

- Preparation and organization
- Help students to solve problems - don't do it all yourself
- Encourage participation, make tutorials interactive

Tutorials

Preparation:

- Write down the things to mention
- Make sure you understand all the material
- Write notes on the problems to discuss
- Check the room in advance first time (location, chalk, projector, screen).

First tutorial: Make it friendly

- Introduce yourself, give contact details
- Learn the students' names
- Discuss how you plan to run tutorials:
 - ▶ Tell them what to expect from you
 - ▶ Tell them what you expect from them

Tutorials: general points

Running good tutorials:

- Start with an overview - structure and material to be covered.
- Be friendly, responsive and supportive
- Praise students when possible
- Show your interest in the topic
- Involve students in the discussion
- Don't assume a student *ought* to know something
- Look for patterns and principles when solving problems, and emphasize them; fit things into a bigger structure
- Close with a summary and an indication of material in next tutorial

Tutorials: Honours vs service courses

- Group size is larger in service courses
- In service courses students solve unseen problems in real time in the tutorial; tutor provides individual help to students as required.
- In honours courses students are expected to have thought about problems beforehand. Tutorial should be interactive, involve students producing and discussing solutions.
- In either case, encourage students to raise general questions about the lectures or the work.

Tutorials: Discussing a problem

When going through a maths problem with a student try to

- First solve the problem yourself at each step thinking of why you made that particular step
- Translate this into questions you can ask the student to lead them through solving the problem
- Get them to start thinking about it independently (what do you think the question is about?, Is this similar to other questions you have done?)
- Let the student do the problem not yourself, but let them know if they are thinking the right way.

Tutorials: possible styles

In honours tutorials, want to encourage student involvement: focus tutorials on students working on problems in small groups or presenting solutions to each other.

Techniques:

- Rounds: each student speaks in turn
- Buzz: small groups of 2 or 3 work together
- Pyramids: individuals→pairs→larger groups
- Randomise who presents solutions rather than asking for volunteers.

Computer practicals

Students will be learning some kind of software

- Let them work on the practical and answer any questions (possibly indirectly by giving hints)
- Do not take over from the students showing what to do at the computer
- Give them instructions but you need to let the students do the actual work

Tutorials: practicalities

- Lecturers will:
 - ▶ Provide problem sheets and model solutions.
 - ▶ Suggest suitable tutorial problems and indicate the progress of the course.
- You will be assigned a staff mentor. The mentor will observe one of your tutorials early in the term, and you should feel free to ask them for further help.
- You are expected to record tutorial attendance, and marks if you are also doing marking.
 - ▶ Attendance is usually recorded using a signature sheet (printed from records programme). Enter the data promptly into the records database.
- If you need to keep evidence of teaching practice (6 items of marked homework for example) make sure to collect it during the term

Marking

The purpose of marking homework is to:

- diagnose students' strengths and weaknesses
- provide information for them to assess their own progress
- motivate students

Good feedback is:

- Accurate: solutions may be correct even if they don't correspond to model solution
- Timely
- Appropriately detailed
- A balance of positive and negative: give suggestions for improvement whenever possible
- Future oriented: aim is to help students learn, not just justify mark awarded

Marking

Write feedback on homework:

- Praise the students if they are doing well
- If there is a mistake, point out where the student has gone wrong and say why it is incorrect
- Be professional and constructive. Try not to be negative.
- Indicate what the next step should have been
- Correct any incorrect or unclear notation
- Indicate if part of the answer is missing

Marking: practicalities

The grade should be written on the front of the script. Conventions:

- Grade A: 80-100% - essentially all correct
- Grade B: 60-80% - some important errors
- Grade C: 40-60% - about half right
- Grade D: 20-40% - a weak attempt
- Grade E: 0-20% - no serious attempt

Grades D & E are counted as unsatisfactory in progress monitoring system.

The course lecturer acts as the mentor for markers and should provide

- Model solutions
- Timetable, when & how to collect & return work.
- Guidance on marking: discuss marking with them first time

Lectures

Aim of lectures is to:

- Present the mathematical theory, work through proofs
- Present examples of the application of new methods
- Demonstrate the process of constructing mathematical arguments in action
- Address student questions, resolve difficulties in understanding

Lectures: General points

- Cater for different learning styles by presenting a balance of theory and examples, and using heuristic explanations and diagrams where appropriate
- Ensure your presentation is well-organised, and emphasize key information
- Convey your enthusiasm for the subject to stimulate student interest
- Provide opportunities for student involvement
 - ▶ Stop regularly and ask for questions
 - ▶ Ask questions of the audience; can be useful to have a device for selecting students at random to respond

Lectures: General points

- Lectures begin at X:05 and end at X:55 to provide time for students to reach their next lecture.
- Department policy requires lecturers to provide a brief (1-2 line) outline in advance of each lecture: on DUO or the course webpage
- It is useful to provide students with additional sources of information: I recommend identifying a recommended text for the course if possible.
- **Innovation is encouraged.** New approaches to teaching are welcome; discuss ideas with your mentor to start with. Note however that changes in assessment methods require university-level approval.

Homework and Examinations setting

Homework plays a key role in student learning. Problem sets should include:

- Problems covering all key ideas in the course
- Straightforward problems so students can gain experience and confidence in applying the material
- More challenging problems in the format of examination questions to enable students to accurately assess their progress
- Problems involving applications to unseen situations to encourage students to develop as independent learners.
- More problems than you will use for homework and tutorial problems.

The preparation of a good problem set is a significant effort, and you should allow time for it when teaching a new course. If you have inherited a problem set from a previous lecturer, it is still important to look through it and update it.

Homework and Examinations setting

Examinations should provide an opportunity for all students to demonstrate their abilities.

Examinations in Durham are usually structured in two sections:

- Section A questions are short, straightforward problems allowing students to demonstrate their abilities across the full range of material in the course.
- Section B questions are longer, and should include a 'sting in the tail' to discriminate between the best students
- The expectation is that average marks on section A questions will be higher than for section B
- The pass mark is 40%. A first class mark is more than 70%.

The process of examinations setting in the UK is very different from other countries. The examinations handbook and exams webpage (linked from internal staff page) provide more detail of local procedures.

Feedback

The department collects feedback from students

- Through student representatives at the Staff-Student Consultative Committees, which meet in the 5th week of Michaelmas and Epiphany terms
- Through questionnaires at the end of each term

It is good to encourage students to provide feedback informally, so problems can be identified and resolved at an early stage.

Your feedback is also important:

- Information on how courses ran is collected at the end of each term through a web-based questionnaire
- I would also be interested in your views of the university's training for new staff.

Other sources of help

- Mentors: all members of staff are assigned a mentor. They are the first people to ask for any question about the department or the university.
 - ▶ Your mentor should observe your teaching at least once early in the year
 - ▶ They can also provide advice on constructing appropriate problem sets and writing exams
- Guidance notes for new members of staff
- Internal staff page: <https://www.maths.dur.ac.uk/secure/staff/>
- MSOR network: <http://www.ltsn.gla.ac.uk/>
Note induction session for new staff in September