

COURSE INFORMATION FOR MA20217 (ALGEBRA 2B)

SEMESTER 2, 2017/18

Lecturers: David Calderbank (d.m.j.calderbank@bath.ac.uk), office 4W 3.41,
Thomas Cottrell (t.p.cottrell@bath.ac.uk), office 6W 1.7,
Alastair Craw (a.craw@bath.ac.uk), office 4W 3.49.

David will lecture for the first two weeks; from week 3, until further notice, David will lecture on Wednesday, and Thomas on Thursday and Friday.

Lectures. There are three lectures per week:

- Wednesdays at 10:15 in EB1.1;
- Thursdays at 11:15 in CB1.10;
- Fridays at 17:15 in EB1.1.

The unit runs for 11 weeks.

Assessment. Assessment – 100% exam.

Unit website: The unit website contains information about MA20217. You'll be able to download lecture notes, problem sheets and solutions when they're available. See

<http://people.bath.ac.uk/dmjc20/Alg2B>

There's also a link to this url from the moodle page for MA20217.

Aims of the unit: To introduce the students to basic abstract ring theory and provide a thorough structure theory of linear operators on a finite dimensional vector space.

Learning Outcomes: After taking this unit, students should be able to:

- Demonstrate understanding of the basic theory of rings.
- Factorise in various integral domains they have met throughout the course and demonstrate understanding of the general theory.
- State and prove fundamental results on the structure theory of linear operators.
- Apply the structure theory of linear operators in examples. Determine characteristic polynomials, minimal polynomials, geometric and algebraic multiplicities as well as the Jordan normal form for a given linear operator. Calculate generalised eigenspaces

The structure of the unit. The unit is divided into five sections, and we'll cover each section in roughly two weeks, normally comprising five lectures plus one problem session. In addition, you have weekly tutorials with a postgraduate student tutor.

Exercise sheets. You'll receive these on the Wednesday lecture each week; please submit your solutions by 3pm on Thursday of the following week to the pigeonholes near the lifts on the ground floor of 4W. Tutorials start during the week beginning Mon 12th February. We'll assign only a couple of problems each week to encourage you to submit solutions. Please please please please do so!!

Weekly tutorials with your postgraduate student tutor. The tutorials take place during the first half of each week, beginning in the second week of the semester. Please ask your tutor questions, and please please submit work to them. When you do submit work, please also:

- remember that your solutions will be read by a human being. Write in sentences, in English, don't simply list lots of mathematical symbols. They want to know what you're thinking, so tell them!
- feel free to offer descriptive partial strategies for those problems where you can't give a full solution, e.g., '*My hope had been to apply Lemma 2.4, but I don't see why this ring satisfies the conditions of that Lemma. Help!*' or similar.

The problem classes. We'll run a problem session during a lecture (or possibly just part of a lecture) once every two weeks to help you consolidate your understanding of the unit.

Books that you might find useful. The lecture notes should guide you through the course. There are also many books that cover some or all of the content, including:

- *A first course in abstract algebra* by John Fraleigh.
- *Linear algebra* by Serge Lang.