

material covered in MAT237, SUMMER 2013

Please note, the following is a tentative list of the material from Folland's Advanced Calculus to be covered in the course, and this list will be supplemented by the maps, notes and optional readings. The 'maps' present the reader with a wider point of view of the important material, while the 'notes' try to highlight some important points which are often remain hiding in the textbook. The 'optional readings' will present the reader with more practice exercises and they are often copied from other competent textbooks.

- 1.1: 1.1, 1.2, 1.3, review of dot product, projection (and orthogonality), review of cross product, the determinant notation, properties of cross product, in particular the area of the parallelogram.
- 1.2: All of section 1.2 in details.
- 1.3: all of section 1.3 in details (special emphasis on the the sequence of theorems: 1.9 - 1.12 as a tool for proving/illustrating continuity of a function.) Also the use of inequality 1.3 in proving continuity and limit.
- 1.4: knowledge of sequences in assumed from MAT137, we will cover only theorems 1.14 and 1.15. WE may skip exercises 6,7
- 1.5: Review of the lub (from 137) we cover all of this section and we skip exercise 9, limsup.
- 1.6: cover everything in details up to the top of page 32. We shall skip Heine-Borel (theorem 1.24).
- 1.7: all the details and proofs (special emphasis on IVT and theorem 1.30.)
- 1.8: All of this section in details.
- 2.1: we shall review pages 43 to 46 (using our new notation of differentiability. Skip the rest until the bottom of page 50 and we cover page 51. (exercises 5,6 and 10 can be skipped.)
- 2.2: all of this section (plus the proofs) is important.
- 2.3: theorem 2.26 is important and its proof is really colorful: it uses many ideas from the past, and presents a nice review of the past techniques. 2.29 is very important and useful, pages 65,66, 67 should be read carefully, we can skip 2.36, and then seriously read bottom of page 68 and page 69.
- 2.4: We cover this section completely in all its details.
- 2.5: this section is a good application of chain rule and it will appear again in chapter 3 and further. We cover all of this section.

- 2.6: up to corollary 2.46, then we skip the rest until multi-index Notation and the multinomial theorem (these we cover).
- 2.7: Skip Taylor with integral remainder, but start from page 88 with Lagrange remainder and let's cover everything in details.
- 2.8: everything in details (special emphasis on theorem 2.81, its applications and proof.)
- 2.9: everything in details
- 3.1: everything in details
- 3.2: everything in details
- 3.3: everything in details
- 3.4: everything in details
- 3.5: we skip this section
- 4.1: all of the section but we will skip 4.16. (special emphasis on lemma 4.5 and its applications in the proofs of the later theorems.)
- 4.2: all up to the inner and outer area, then we skip page 164 and 165 and we will do 4.24 and 4.25 in detail. (we can skip exercises 3-6)
- 4.3: we cover all in details, but of course no proof for 4.26, and we can skip centroid and moment of inertia and the related exercises.) special attention to exercises 13
- 4.4: all of the section (but the idea of proof of 4.37 is important and not the rigorous proof)
- 4.5: all up to the end of example 3, skip the rest
- 4.6: we skip this as well as sections 4.7 and 4.8
- 5.1: all up to Rectifiable curves (page 219.) also skip exercises 2,8,9
- 5.2: all of this section
- 5.3: all of this section
- 5.4: we will do all but we shall skip 5.25 and 5.27
- 5.5: all of this section (we can skip proof of divergence theorem but we will have some informal presentation on it.)
- 5.6: we skip this section
- 5.7: all of the section, but a sketch of the proof of Stokes' theorem will be presented only if we have time
- 5.8: up to the middle of page 264 (end of example 4) but we may mention theorem 5.64