C5.3, Statistical Mechanics

General Information

03 February 2021

Purpose of this document

This document is intended to be the central information hub of this course. In addition to information about the structure of the course, it will also contain updates, extensions and announcements on questions as they arise, and hence there will be very likely frequent updates. So please read the contents of this document carefully and revisit it when you have questions. In particular, if I want to make additional information available, I will use this document to publish links to OneDrive folders or OneNote notebooks, for example.

Contact Information

My name is **Andreas Münch**. My surname is officially transcribed as Muench for the case where you cannot produce the umlaut on your keyboard, but I am used to being addressed as Munch. The only instance where you need to get the transcription right is if you want to write me an email (email servers are intolerant), which is muench, followed by the usual address information for members of the Mathematical Institute (In other words, my **email address** is: muench 'at' maths 'dot' ox 'dot' ac 'dot' uk). You are welcome to write to me. Notice that all contact with me this term (HT 2021) will be exclusively by online communication.

Structure of the course

The course is planned to have four problem sheets and 15 video-recorded lectures. Currently, 12 of these have been recorded (update Feb 4: the remaining 3 lectures have been recorded too). The length of each lecture does not match the typical class room lecture, usually, they are shorter. This is partly due to adaptions to the online format, and partly due to the fact that this particular course is new and the portioning of the material into lectures was not fully worked out before the recording. You may think of these lectures as chapters. Also, do not be worried that we are one lecture short of 16; the material should be roughly equivalent to a 16 lecture course given in class. (For my PDE course, B5.2, I have a direct comparison: my teaching in class in MT 2019 filled 16 lectures in class of 50 minutes length each, but mapped to 15 videos (with sub-parts), that were shorter than 50 mins for the online lectures in MT2020.)

There will be four problem sheets, the last one will be over the (Easter) break. The mapping of lectures to problem sheets follows the 4 lectures : 1 problem sheet ratio for the first three problem sheets. The last problem sheet is a bit of a mix: It covers material from lectures 13-15, with some catch-up/spill-over from the preceding lectures on Boltzmann's equation and some questions that will help you refresh your knowledge of the first half of the course.

To help structuring the material further, I have frequently subdivided the lectures into two or more parts. As of now, (updated Feb 3), the list of videos (published on the MI's panopto web site) is as follows.

Lecture 1
Lecture 2
Lecture 3, part 1, part 2
Lecture 4, part 1, part 2
Lecture 5, part 1, part 2
Lecture 6
Lecture 7, part 1, part 2
Lecture 8, part 1, part 2, part 3, part 4
Lecture 9, part 1, part 2
Lecture 10, part 1, part 2
Lecture 11, part 1, part 2.1+2.2, part 2.3+2.4
Lecture 12
Lecture 13
Lecture 14
Lecture 15, part 1, part 2

Course Material

Problem sheets will be made available through the course web page as usual.

The slides I use for the recording will be posted online on the course web page. There may be updates, and it is likely that I will upload an additional file with the amendments and preserve the material from the original recording, but I will decide this closer to time when the necessity arises.

Lectures 1-8 and 13-15 cover material from Jim Sethna's book. This book can be bought from OUP, but there is also a free online (living document) version available on Jim Sethna's web page:
                http://pages.physics.cornell.edu/~sethna/StatMech/
You WILL need this book as the problems on the problem sheets directly refer to questions in this book, so **please download your copy of Jim Sethna's book at the beginning of term.**

Lectures 9-12 are covered in Andrew Fowler's lecture notes, which I will post on the course material web page.

Office Hours

Office hours have been announced through the MS Teams chat. Please note that I have asked to send in questions prior to the office hour, and set a deadline for doing so.