Topology – F10PC1 & F11PE1 – Autumn 2011

Contact info

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Timetable

Event	Time	Room
Lecture	Tue 15:15	CM G.01
Lecture	Thu 11:15	CM G.01
Lecture	Fri 9:15	CM G.01
Tutorial (F10PC1 only)	Fri 10:15	CM G.01
Tutorial (F11PE1 only)	Fri 13:15	SR 213B

Syllabus

- **Introduction:** An informal presentation of some of the notions in topology, including the Euler characteristic and different types of surfaces. [3 lectures]

- **Continuity:** We will precisely define abstract topological spaces, as well as the fundamental notions of continuity, continuous functions, and homeomorphisms. [5 lectures]

- **Compactness and connectedness:** In Euclidean space, a compact set is a closed and bounded one. We will generalized this notion to more abstract settings, and discuss various implications of this property. We will also discuss connectedness, which is a precise way of saying that the space is all in one piece. [7 lectures]

- **Identification Spaces:** One way to create new spaces is to identify certain pieces of a known space. For example, one obtains a Möbius strip by taking a rectangle, giving it a half twist, and then identifying a pair of opposite edges. We will discuss generalizations of this and the associated topologies. [3 lectures]

- **Fundamental Groups:** We will construct a group associated to each surface, which essentially characterizes the holes that are in the surface. This notion will be used to classify surfaces and prove results like the Jordan Curve Theorem and the Brouwer Fixed Point Theorem. [9 lectures]

- **Surfaces:** We will revisit the classification of surfaces and Euler characteristics, introduced earlier in the semester. [3 lectures]

Note: the number of lectures on each topic is provisional.

Assessment

Your assessment will be based entirely (100%) on the final exam.

If you are registered in F10PC1, this will be a 2 hour exam with 4 questions, of which 3 will be marked. These questions will be based on the material presented in lecture and contained in the tutorial sheets, and each will be worth 20 marks.

If you are registered in F11PE1, this will be a 3 hour exam with 5 questions, all of which will be marked and worth 20 marks. Four of the questions will be based on material presented in lecture and contained in the tutorial sheets, and one will be based on additional reading. (I will let you know in advance what this material is.)

Feedback

There are several ways in which you can obtain feedback about how you are doing in the course. For example, roughly midway through the semester we will have a "practice exam" during one of the lectures. I will mark this and return it to you (although it will not count toward your assessment), so that you can get a sense of how well you are understanding the material, and if you are on track to obtain the marks you want on the final exam. In addition, there will be opportunities for you to obtain feedback during the tutorials.

Tutorials

Most weeks the tutorials will be used to discuss the exercises that were handed out during the preceding week. Solutions to these exercises will be posted online sometime after that (but in advance of the final exam). It is very important that you make a concerted attempt to solve these problems on your own, preferably before just listening to someone else tell you what the solution is or reading the solutions once they are posted online. As I'm sure you've all heard before, you can only learn mathematics by doing it yourself.

Occasionally I may write an exam-like question on the board, for you to attempt on your own during the first half of the tutorial. The second half of the tutorial will then be used to go through the solution, indicating what would earn you marks, so that you can obtain feedback on how well you are understanding the current topic.

Webpage

All course materials and announcements will be posted on the course webpage:

`http://www.ma.hw.ac.uk/~mb341/Autumn11/topology.html`

If I need to contact you via email, I will do so using the VISION system. Other "official" information about the course can be found at

`http://www.ma.hw.ac.uk/maths/courseinfo/`

Sample exams

I will post a sample exam paper on the course webpage a few weeks before the actual exam is to take place.

Recommended books

If you would like some books to supplement the notes you take in lecture, I recommend the following two, both of which are available in the Heriot-Watt library.

- "Basic topology," by M. A. Armstrong. Springer-Verlag 1983. (Reprint of the original 1979 version.)
- "Topology: a first course," by J. R. Munkres. Prentice-Hall 1975.