

In Legon: Overall title "Homology"

3 hours per day, 5 days a week, 2 weeks

Week I "Singular homology"

Idea - Prove Brower's FT while introducing categories, functors, exact sequences, etc.

Day 1 Intro, categories & functors & how the proof works,
"pictorial" view of homology.

Day 2 Formal def. to homotopy invariance.

Day 3 Relative homology, short & long exact sequences

Day 4 Excision, $\tilde{H}_k(S^n)$, "small simplices".

Day 5 Proof of excision.

Week II "Khovanov homology"

From Jones to Rasmussen - ...

Day 1 Knots, Reidemeister moves, the Kauffman bracket and the Jones polynomial.

Day 2 Khovanov homology for closed knots.

Day 3 KH for tangles

Day 4 Fast computations, knot cobordisms.

Day 5 "Overflow" time.

In practice the second week is less dense than the first, so the first may overflow into the 2nd.

In Kumasi: 2 days, 2 talks, perhaps

* Rubik's *

* Hyperbolic gliding.

* Hyperbolic gliding.

Margaret (and Isaac),

Ok, I thought some more and here's my proposal.

My overall title in Legon will be "Homology". I will be talking for three hours a day, (say) two in the morning and one in the early afternoon, with the understanding that the afternoon class may sometimes extend a bit more than an hour if we need to finish a subject. To the extent there is interest I will stay around and be available for students until later in the afternoon or evening. This will go on for two weeks of five days per week.

On the first week I will talk about singular homology of topological spaces with the goal of saying everything that is necessary to prove the Brouwer fixed point theorem by computing the homology groups of spheres using excision, short and long exact sequences, homotopy invariance, etc. Everything that I will say is in many books and is at least 50 years old.

On the second week I will move on to talk about Khovanov homology for knots. This will be a quick introduction to a very hot topic of current research in knot theory, and while I will make no direct use of the results of the first week, many of the concepts introduced in the first week will have to be used again and extended in the second. So the overall theme will remain the same, and thus the overall title will be "homology".

The second week will be a little less dense than the first, so the first may overflow a bit into the second. We will not make plans for talks on any of the "isolated" topics I proposed earlier, yet if there is interest and energy left, we may add such talks as appropriate.

I will then travel by land to Kumasi and spend Monday and Tuesday June 28 and 29 there, and give one or two talks on isolated topics in coordination with Isaac Dontwi. On June 30 I will return to Toronto.

My internal notes on the subject are at

<http://katlas.math.toronto.edu/drorbn/AcademicPensieve/2010-06/index.html>

and especially at

http://katlas.math.toronto.edu/drorbn/AcademicPensieve/2010-06/one/Ghana_prepreeplanning.pdf.

These pages will continue to evolve later on.

Let me know what you think; I'll be happy to hold another phone meeting soon to see what changes need to be made...

Best,

Dror.

A possible alternative topic: Classical & Quantum Mechanics

Week I

1. Calculus of variations, classical mechanics.
2. The Hamiltonian formalism
3. Symmetries & conservation laws.
4. Differential forms
5. Maxwell's equations.

No

Week II

1. Hamiltonian quantization
2. Non-commutative probability
3. Path integrals
- 4.
- 5.