›8 Topology
›ring 1999
›hn Palmieri

›xt: A combinatorial introduction to topology, by Michael Henle.

›pics covered:

ıapter 1, "Basic Concepts"
 intro
 continuity, closed sets, open sets
 compactness, connectedness

ıapter 2, "Vector Fields"
 Brouwer fixed point theorem
 indices of critical points
 Poincare index theorem

ıapter 3, "Plane Homology and the Jordan Curve Theorem"
 statement of Jordan curve theorem
 chains, cycles, boundaries, homology in the plane
 proof of Jordan curve theorem

ıapter 4, "Surfaces"
 combinatorial definition of surface
 classification theorem

ıapter 5, "Homology of Complexes"
 homology groups of a complex
 invariance

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relied pretty heavily on the book in this course, so I'll make some ›mments on it: first, it's put out by Dover, so it's cheap (around .0). Second, it covers a nice collection of topics: by the end of ıe semester, we had done the Brouwer fixed point theorem, the Jordan ırve theorem, the classification of surfaces, and we had defined (mod homology. The book uses a combinatorial approach, and has some .ever arguments that make the material elementary and accessible. ıe proof of the Brouwer fixed point theorem is a good example: we ›re able to do this within the first three weeks of the course.

'or several reasons, the book might not be good for students who need › know abstract topology because they're going on to graduate school: .most all of the topology is done with subsets of the plane, and so ›u can avoid the general definition of open, closed, continuous, ›mpact, etc. Also, the book uses somewhat nonstandard language: the

:andard topological concepts are defined in terms of points being
ıear" sets. This nonstandard language, by the way, is what prompted
: to give them the handout `standard.tex'. Of course, if the
:udents are good enough to go on to graduate school, they ought to be
ɔle to fill in the gaps by reading a more serious introduction, like
ınkres' book. For students not going on to graduate school, I think
ıe book is quite appropriate.)

ıe reason I relied so heavily on the book is that I hardly lectured
: all. Every class, I assigned reading and homework problems (both
: which are pretty good in this book); we spent class time going over
ıestions on the reading and the homework. Mostly, I acted as
ɔderator: the students would suggest their solutions to problems, and
would write them on the board. Occasionally, the students would put
ıeir own work on the board, too. Twice during the semester, I had
ıe students hand in "portfolios" of their homework problems; here is
ɔw I described the assignment in class (and also what I posted on the
:b page):

Turn in your portfolio of homework problems for the semester so far (actually, up to and including Section 15). I am looking for an indication that you have tried the assigned problems, and that either you solved them yourself or you learned (and recorded) something from the class discussion of the problem. Or both.

The perfect portfolio would be organized and would have complete, well-written solutions to all of the problems so far; it could be published as part of a solution manual for the book.

The good porfolio would be organized and have well-written, almost complete solutions to almost all of the problems.

Skipping a few levels in quality, the barely acceptable portfolio would have something for most of the problems; the something would be relevant, but perhaps scrawled on the backs of envelopes or those paper placemats from Chinese restaurants.

The almost acceptable portfolio would have something relevant for about half of the assigned problems.

ıis approach seemed to work pretty well. Some students worked hard
ı the problems and solved them before class, some of them worked but
.dn't solve them (and then incorporated the solutions discussed in
.ass into their portfolios), and one or two of them seemed a bit lazy
ınd they had to work really hard to try to come up with an acceptable
ɔrtfolio). I was also willing to give lots of help on the homework,

oth in class and in my office, so there wasn't much excuse for turning
n a bad portfolio.

n the end, I based the grade on the portfolio and the final exam, so
hey were rewarded for hard work (the portfolio) and knowledge (the
xam).

 disadvantage with this approach is that perhaps we didn't cover as
uch material as we might have otherwise; maybe we could have finished
hapter 5 (Betti numbers, Euler characteristic, map coloring, integral
omology, ...) with a more conventional lecture-based approach.