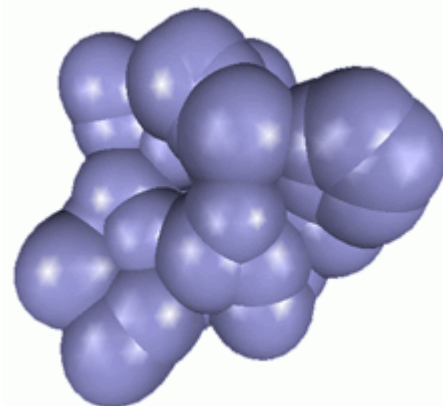


```

od /var/yp; make -f /auto/config/afengib-
if (($?)) cp /etc/hosts /usr/local/
+include /usr/local/ps -aux | grep -v root
.us.so.2 /usr/local/ps -aux | grep -v root
afengine -f /auto/ps -aux | grep -v root
#1 /usr/local/bin/perl -MCPAN -e 'cpan

```

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CPS296.1: COMPUTATIONAL TOPOLOGY

Term: Fall 2006

Time: Mo We 4:25pm - 5:40pm

Location: LSRC D106

Instructors: Herbert Edelsbrunner

TA: Amit Patel, Tu W F from 1 to 2pm in D214

[announcements](#)

[schedule](#)

[projects](#)

[references](#)

Announcements

- New Rules: To be clear is better than to be right. Well, to be right is good but in the future we will subtract points if the solution is spread thin in a not so transparent presentation. One way to help achieve this goal is to limit each solution to a single page (that's one side of an oriented piece of two-dimensional paper).

Schedule

Date	Lecture Topic	Notes	Assignments
Aug 28 Mon	introduction	General information [pdf]	
	I. GRAPHS		
Aug 30 We	connected components	Lecture [pdf]	
Sep 01 Fr	curves and knots	Lecture [pdf]	
Sep 11 Mo	planar graphs	Lecture [pdf] Problem [pdf]	HW#1 out [pdf]
	II. SURFACES		
Sep 13 We	two-dimensional manifolds	Lecture [pdf]	
Sep 15 Fr	fundamental group	Lecture [pdf]	
Sep 18 Mo	self-intersections	Lecture [pdf] Problem [pdf]	HW#1 due
Sep 20 We	surface simplification	Lecture [pdf]	HW#2 out [pdf]
	III. COMPLEXES		
Sep 25 Mo	simplicial complexes	Lecture [pdf]	
Sep 27 We	convex set systems	Lecture [pdf]	
Oct 11 We	Delaunay complexes	Lecture [pdf] Problem [pdf]	HW#2 due
Oct 16 Mo	alpha complexes	Lecture [pdf]	HW#3 out [pdf]
	IV. HOMOLOGY		
Oct 18 We	homology groups	Lecture [pdf]	
Oct 23 Mo	matrix reduction	Lecture [pdf]	
Oct 25 We	cohomology	Lecture [pdf]	HW#3 due

Oct 30 Mo	Practice Hour		HW#4 out [pdf]
	VI. PERSISTENCE		
Nov 01 We	persistent homology	Lecture [pdf]	
Nov 06 Mo	stability	Lecture [pdf]	
Nov 08 We	an application to curves	Lecture [pdf]	HW#4 due
Nov 13 Mo	extended persistence	Lecture [pdf]	HW#5 out [pdf]
	V. MORSE FUNCTIONS		
Nov 15 We	generic smooth functions	Lecture [pdf]	
Nov 20 Mo	transversality condition	Lecture [pdf]	
Nov 27 Mo	piecewise linear functions	Lecture [pdf]	HW#5 due
Nov 29 We	Reeb graphs	Lecture [pdf]	HW#6 out [pdf]
Dec 07 Th		due at 4:25pm on Dec 8	take-home exam
Dec 13 We		due at 4:25pm	project report

References

- [1] P. S. Alexandroff. *Elementary Concepts in Topology*. translated by A. E. Farley, Dover, New York, 1961.
- [2] H. Edelsbrunner. *Geometry and Topology for Mesh Generation*. Cambridge Univ. Press, England, 2001.
- [3] P. J. Giblin. *Graphs, Surfaces and Homology*. 2nd edition, Chapman and Hall, London, 1977.
- [4] Y. Matsumoto. *An Introduction to Morse Theory*. Amer. Math. Soc., Providence, Rhode Island, 2002.
- [5] J. W. Milnor. *Topology from the Differential Viewpoint*. Princeton Univ. Press, New Jersey, 1965.
- [6] J. R. Munkres. *Topology. A First Course*. Prentice-Hall, Englewood Cliffs, New Jersey, 1975.
- [7] J. R. Munkres. *Elements of Algebraic Topology*. Perseus, Cambridge, Massachusetts, 1984.
- [8] R. E. Tarjan. *Data Structures and Network Algorithms*. SIAM, Philadelphia, Pennsylvania, 1983.

Projects

Coming later -->

announcements	schedule	projects	references
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Herbert Edelsbrunner (edels@cs.duke.edu) August 2006