

**COURSE OUTLINE and HOMEWORK ASSIGNMENTS** – subject to changes :

We will cover the first 11 chapters of the textbook thoroughly and skim the last 5 chapters. Numbers right of the dates refer to sections in the textbook. Three exercises are suggested for each lecture.

L-1	Mon	12 Jan	1.1	definition and examples – convex hulls, first algorithm – 1,2,3
L-2	Wed	14 Jan	1.1-4	2nd convex hull algorithm – degeneracies, robustness, applications – 4,7,9
L-3	Fri	16 Jan	2.1	line segment intersection – plane sweep algorithms – 1,2,3
	Mon	19 Jan	<b>Martin Luther King Day – no classes</b>	
L-4	Wed	21 Jan	2.2	output sensitivity – event queues – doubly connected edge lists – 4,5,6
L-5	Fri	23 Jan	2.3-5	overlays of subdivisions – boolean operations – 7,8,9
L-6	Mon	26 Jan	3.1	triangulations and colorings – the art gallery theorem – 1,2,3
L-7	Wed	28 Jan	3.2	partitioning a polygon into monotone pieces – 5,6,8
L-8	Fri	30 Jan	3.3-4	triangulating a monotone polygon – 10,13,14
L-9	Mon	2 Feb	4.1,2	geometry of casting – half-plane intersections – 2,4,5
L-10	Wed	4 Feb	4.3,4	incremental and randomized linear programming – 10,11,12
<b>Project One due on Friday 6 February by 10AM</b>				
L-11	Fri	6 Feb	4.5,6	unbounded linear programs – LP in higher dimensions – 13,15,16
L-12	Mon	9 Feb	5.1,2	range searching – Kd trees – 1,2,3
L-13	Wed	11 Feb	5.3,4	range trees in dimensions 2 and higher – 6,8,9
L-14	Fri	13 Feb	5.5-7	general sets of points – fractional cascading – 10,11,12
L-15	Mon	16 Feb	review of the first five chapters	
L-16	Wed	18 Feb	<b>first midterm exam covers chapter 1 through 5</b>	
L-17	Fri	20 Feb	6.1	point location and trapezoidal maps – 1,3,4
L-18	Mon	23 Feb	6.2	a randomized incremental algorithm – 5,7,8
L-19	Wed	25 Feb	6.3,4	dealing with degenerate cases – a tail estimate – 11,13,15
L-20	Fri	27 Feb	7.1	Voronoi diagrams, definition and basic properties – 1,2,3
L-21	Mon	2 Mar	7.2	computing the Voronoi diagram – 4,6,8
L-22	Wed	4 Mar	7.3,4	Voronoi diagrams of line segments – farthest points – 9,10,11
L-23	Fri	6 Mar	8.1,2	supersampling – computing the discrepancy – duality – 1,2,3
L-24	Mon	9 Mar	8.2,3	duality – arrangements of lines – 5,6,9
L-25	Wed	11 Mar	8.4,5	levels and discrepancy – 10,12,13
<b>Project Two due on Friday 13 March by 10AM</b>				
L-26	Fri	13 Mar	9.1,2	triangulations of point sets – the Delaunay triangulation – 1,2,3
L-27	Mon	16 Mar	9.3	computing the Delaunay triangulation – 5,6,8
L-28	Wed	18 Mar	9.4,5	analysis – a framework for randomized algorithms – 9,11,16
L-29	Fri	20 Mar	10.1	more geometric data structures: interval trees – 1,4,9
L-30	Mon	30 Mar	10.2	priority search trees – 2,3,10
L-31	Wed	1 Apr	10.3	segment trees – 5,7,8
L-32	Fri	3 Apr	review of chapters 6 to 10	
L-33	Mon	6 Apr	<b>second midterm exam on chapters 6 through 10</b>	
L-34	Wed	8 Apr	11.1	the complexity of convex hulls in 3-space – 1,3,4
L-35	Fri	10 Apr	11.2	computing convex hulls in 3-space – 5,6,7
L-36	Mon	13 Apr	11.3,4	analysis – convex hulls and half-space intersection – 8,9,10
L-37	Wed	15 Apr	12	binary space partitions and the painter's algorithm – 1,2,3
L-38	Fri	17 Apr	13	robot motion planning – Minkowski sums – 1,4,5
L-39	Mon	20 Apr	14	quadtrees and non-uniform mesh generation – 1,3,4
L-40	Wed	22 Apr	15	visibility graphs – finding shortest paths – 1,2,4
<b>Project Three due on Friday 24 April by 10AM</b>				
L-41	Fri	24 Apr	16	simplex range searching – partition trees – 1,3,5
L-42	Mon	27 Apr	review of chapters 1 through 5	
L-43	Wed	29 Apr	review of chapters 6 through 10	
L-44	Fri	1 May	comprehensive review	

**Friday 8 May, 10:30AM–12:30PM : Final Exam – room to be announced.**