COURSE OUTLINE – subject to changes :

Numbers of suggested exercises follow the list of topics for each lecture.

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

Final exam: Wednesday 7 May 2025, 1:00PM-3:00PM, Taft Hall 219.