Algorithm	Description	Lecture
Terrain Generation Algorithms		
Prim's Algorithm	For building perfect mazes, in a grid choose a random frontier to add to the spanning tree eventually creating the maze (or spanning tree)	4
Aldous-Broder/Wilson	Same as Prim's but add longer segments which tends to reduce branching. Take a random walk and connect it without cycles	4
Recursive Midpoint Bisection	Can get good mountain profiles, so it is good for 2D maps (left to right movement). Choose a random midpoint on a random line and connect the ends of the line to a point on the normal at the midpoint. Repeat	5
Perlin Noise	For terrain generation. Pseudo random. Make a unit square, and find "random" vectors at the corners of the square. Use a fade function on the relative location of the point and then linearly interpolate (can use a s curve as well)	5
Game Physics Algorithms		
Euler Integration	Basic physics to calculate the new position of an object given velocity and acceleration	6
Verlet Integration	Uses the previous point's position to calculate the new position, doesn't use velocity directly. $P_{i+1} = P_i + (P_i - P_{i-1}) * \frac{\Delta t_i}{\Delta t_{i+1}} + a * \Delta t_i^2$	10
Collisions		
Ritter's	Heuristic for finding a bounding circle. O(n)	7
Welzl's	Uses double layer of recursion to also find the minimum enclosing circle	8
Minkowski Sum	X+Y : {a+b | a \in X, b \in Y} Why is it useful again?	8
Minkowski Difference	Base for collision detection between convex shapes. X-Y (same as above). If the point (0,0) is included in the convex hull of the difference then the two objects intersect	8
Gilbert-Johnson-Keerthi	Algorithm to find if the point (0,0) lies in the Minkowski difference. Relies on dot products to figure out the direction and closest point.	9
Binary Search for Interpenetration	Use the binary search to find at what time should the object be rewinded to so that it does not penetrate.	9
Pathfinding		
Manhattan Distance	$d(p,q) = \|\Delta x\| + \|\Delta y\|$	11
Hexagonal Distance	$d(p,q) = \max(\|\Delta x\|, \Delta y)$, if $\Delta x \neq \Delta y$ $d(p,q) = \|\Delta x\| + \|\Delta y\|$	11
Dijkstra's	Determine the single source shortest path but is super inefficient	11
A*	Combines greedy and dijkstra's apparently. Optimal compared to either. Note the heuristic is uses can't be an overestimate of minimum distance	11
Hierarchical Path-Finding	More efficient for searching large spaces and in practice 2-3 levels are enough	12
Ramer-Douglas-Peucker	Similar path to A* but uses fewer points to get to the destination. Also it is recursive	12
Rapidly Exploring Random Tree	A heuristic algorithm which is fast and accommodates a lot of variability. Although it is not guaranteed to work but you can iterate it so that it works. (is fast)	12

Shortest Path Roadmap (Reduced Visibility Graph)	Used to find a path in a continuous space. Uses visibility to find the closes reflex vertex to go to. Some drawbacks are that it is expensive and paths touch the obstacles	13
Brute Force Triangulation		13
Ear Cutting	Cut ears off polygons since every polygon has two polygons.	13
Delaunay	Another triangulation algorithm that tends to avoid thin triangles.	14
Hertel Mehlhorn	Optimal for triangulation, by connecting diagonals to the reflex vertices	14
Marshmellow	Spacefilling volumes, start growing marshmellows until the encounter other marshmellows or reach walls or can't grow anymore	14
Rotating Calipers	Diameter calculation, gives us diameter of a convex polygon	15
Silver's	Uses a reservation based approaching doing pathfinding in an extra axis where that axis is time	15
Visibility		
Bresenham's	Line drawing?	16
Art Gallery Theorem	Want to place the minimum number of cameras that cover the entire area. The proof involves a three colouring and putting a camera on a vertex inside all triangles of that colour	16
Asano's	Planar/angular sweet algorithm to determine visibility and works with polygons with hole and arbitrary line segments	16
Artificial Intelligence		
Decision Trees	Use trees with if statements or something	17
Finite State Machines	FSM bra	17
Hierarchical FSM	Better organization of an FSM	17
Behaviour Trees	Like a combo of FSM and Decision Trees	17
Boids: Craig Reynolds	To model a flock of birds and it models the steering behaviours	18
GOAP	I hopefully should know this stuff	20
Hierarchical Task Network (HTN)	Subgoals and such and it can be static or dynamic	
Map Exploration		
Yamauchi	Exploration based on pursuing closest frontiers.	19
Chowdry	Exhaustive exploration	19
Other		
Position History Based Dead Reckoning	Solve dead reckoning or something	23