FA26 — CS 453 Calendar

Computer Graphics • MWF, 50 min • Fall 2026 • Fakhir Shaheen • fakhirshaheen@fccollege.edu.pk

Lec #	Date	Topic	*Deliverables*
1	Mon, 31 Aug	What graphics is (and isn't); setup; first pixels & gradients	
2	Wed, 2 Sep	Bresenham's line algorithm	
3	Fri, 4 Sep	Color & alpha; primitives; fills (inside-test, flood fill)	*A1 released*
4	Mon, 7 Sep	Vectors & the dot product	
5	Wed, 9 Sep	Parametric lines, circles, ellipses	
6	Fri, 11 Sep	Bézier curves; de Casteljau	*A1 due, A2 released*
7	Mon, 14 Sep	2×2 matrices: rotation, scale	
8	Wed, 16 Sep	Homogeneous coordinates; composition & order	
9	Fri, 18 Sep	Reference frames & the scene graph	*A2 due, A3 released*
10	Mon, 21 Sep	Rays: $\mathbf{p} = \mathbf{o} + t\mathbf{d}$; marching & nearest hit	
11	Wed, 23 Sep	2D light & shadow: fan of rays, occluders	
12	Fri, 25 Sep	Exact ray–segment intersection; 2D soft shadows	*A3 due, A4 released*
13	Mon, 28 Sep	3D vectors; cross product; the camera	
14	Wed, 30 Sep	Ray–sphere intersection	
15	Fri, 2 Oct	Multi-object scenes; nearest hit; antialiasing	*A4 due, A5 released*
16	Mon, 5 Oct	Normals; diffuse (Lambert) shading; point lights	
17	Wed, 7 Oct	Shadow rays; reflection & metal	
18	Fri, 9 Oct	Refraction & glass (Snell); recursive rays	*A5 due, A6 released*
19	Mon, 12 Oct	Why Whitted is wrong: radiance, the BRDF, the rendering equation	
20	Wed, 14 Oct	Monte Carlo and the path tracer: one random ray per bounce	
—	Fri, 16 Oct	—	*A6 due*
22	Mon, 19 Oct	Render show-and-tell; midterm review	
—	Wed, 21 Oct	**Midterm**	
—	Fri, 23 Oct	*Fall Break*	*GPU setup check released*
23	Mon, 26 Oct	The GPU: why it exists, how it is built; the frame budget	*GPU setup check due*
24	Wed, 28 Oct	The pipeline: one triangle's trip; inside the rasterizer	*A7 released*
25	Fri, 30 Oct	The API: WebGPU's objects; hello triangle (wgpu-py, WGSL)	
26	Mon, 2 Nov	Fragment shaders in WGSL: a function per pixel; uniforms	
27	Wed, 4 Nov	Light on a sphere: normals, diffuse and highlight in a fragment shader	
28	Fri, 6 Nov	Into 3D: the vertex shader, the MVP chain, the depth buffer	*A8 released*
—	Mon, 9 Nov	*Iqbal Day*	
29	Wed, 11 Nov	A model: loading Suzanne, normals, coloured lights and a spotlight	*A7 due*
30	Fri, 13 Nov	Shadow mapping: a second pass from the lamp, bias, PCF	*A8 due, A9 released*
31	Mon, 16 Nov	The rays return 1: a traced shadow ray beside the shadow map	
32	Wed, 18 Nov	The rays return 2: mirror rays and soft shadows; the hybrid frame	
33	Fri, 20 Nov	Ray marching 1: a scene from a distance	*A9 due, A10 released*
34	Mon, 23 Nov	Ray marching 2: shapes that melt, repeat and cast shadows	
35	Wed, 25 Nov	Splatting 1: a picture from blobs	
36	Fri, 27 Nov	Splatting 2: a blob in 3D	*A10 due, A11 released; Project brief; Proposal assigned*
37	Mon, 30 Nov	Splatting 3: order, and a real scene	*Proposal due*
38	Wed, 2 Dec	Splatting 4: where the blobs come from	
39	Fri, 4 Dec	To be announced	*A11 due*
40	Mon, 7 Dec	To be announced	
41	Wed, 9 Dec	To be announced	*Final project due after the exam period*
—	Thu, 10 Dec	**Final Exams**	

Weekly assignments (released Friday, due the following Friday): A1 Scene from scratch • A2 Balls along Bézier paths • A3 Scene graph (your own scene) • A4 2D light & shadows • A5 First 3D render • A6 Lit & reflective scene • A7 Light that bounces: the path tracer, and a scene built from it • A8 Shaders on the GPU • A9 3D on the GPU: geometry & light • A10 3D on the GPU: textures & shadows • A11 Interactive 3D scene.

Grading: Assignments *(weekly)* 40% • Project 20% • Midterm 15% • Final exam 25%. *There is no attendance policy.*