

# SCHEDULE

Week	Modules	Lectures	Time	Topics	Instructor
Day 1 (July 31)	M1	L1	2	Introduction – Biologics Development Overview	TBA
		L2	2	Upstream – Cell-line development	
				Upstream – Media development	
		L3	2	Upstream – Bioreactor Development and Operation	
				Upstream – Cell-Culture Scale-up	
L4	1	Upstream – Harvest Technology I&II			
L5	1	Upstream – Industrial case studies of upstream processes			
Day 2 (Aug 1)	M2	L6	2	Downstream Processing Technology – Current Status, Challenges, and Future	
				Downstream – Chromatography	
		L7	2	Downstream – Membrane filtration I	
				Downstream – Membrane filtration II	
		L8	1	Downstream – Cryo Technology	
L9	1	Pilot facility and Automations in Bioprocessing Development and Manufacturing			
L10	2	Downstream – Industrial case studies of downstream processes			
Day 3 (Aug 2)	M3	L11	2	Analytical Technology – Current Status, Challenges, and Future	
				Analytics – Protein characterization assays I	
				Analytics – Protein characterization assays II	
		L12	2	Analytics – Bioassay I	
				Analytics – Bioassay II	
L13	3	Analytics – Technologies for clinical bioprocessing and regulatory submission Analytics - CMC Analytical Strategies			
Day 4 (Aug 3)	M4	L14	1	Regulatory and QbD	
		L15	1	Big data analytics for Biopharmaceuticals - DOE and MVDA	
	M5	L16	3	Cell therapy Bioprocessing I	
				Cell therapy Bioprocessing II	
Day 5 (Aug 4)	M6	L17	2	Gene therapy, Science	
		L18	3	Gene therapy Bioprocessing	
		L19	2	Gene therapy bioprocessing case study	