Analytical and Quantitative Light Microscopy
in Biology, Medicine, Materials Science

Marine Biological Laboratory
Woods Hole, MA, USA

2017 SCHEDULE

Wednesday, 5/3/2017			
2:00 - 3:00	Check in and get picture ID		Swope
3:00 - 3:50	Welcome and course orientation	Course Directors, Nishi	Speck Aud (Speck Labs)
4:00 - 4:20	LECTURE: Ray Optics: Making an image	J. Ross	Main lab (Loeb 2nd fl)
4:20 - 4:50	LAB: Group work with lenses and ray tracing	J. Ross/Shah/ Commercial Faculty	Main lab
5:00 - 6:00	Wine and Cheese reception		Swope - Meigs room
6:00 - 7:00	DINNER		
7:00 - 7:20	LECTURE: Ray optics: Apertures and field stops	J. Ross	Main lab
7:20 - 7:50	LAB: Group work with irises and Fourier transforms	J. Ross/Shah/ Commercial Faculty	Main lab
7:50 - 8:10	LECTURE: Ray optics: Building a microscope CONDENSER	J. Ross	Main lab
8:10 - 9:30	LAB: Group work: Building a microscope CONDENSER in Kohler illumination	J. Ross/Shah/ Commercial Faculty	Main lab
9:30 - 9:50	LECTURE: Report out on condenser. Imaging onto a sensor	J. Ross/Shah/ Commercial Faculty	Main lab
9:50 - 10:30	LAB: Building the imaging path; measuring the resolution of your microscope	J. Ross/Shah/ Commercial Faculty	Main lab
Thursday, 5/4/2017			
8:45 - 8:50	Daily Overview	Shah	Main lab
8:50 - 10:30	LECTURE: Wave Optics: Infinity-corrected objectives, Diffraction and Resolution LAB: Measuring the resolution of your microscope	J. Ross	Main lab
10:30 - 12:00	Koehler lecture and lab	J. Ross /Shah /Commercial Faculty	Main lab
12:00 - 1:00	LUNCH		
1:00 - 2:00	Practical aspects of lens design	S. Ross	Speck
2:00 - 3:15	Wave optics, diffraction and contrast generation	Waller	Speck
3:15 - 5:00	Phase Contrast & Darkfield Laboratory	Waller/Kner/Shah/ Commercial Faculty	Main lab
5:00 - 6:00	Point Spread Functions	Goodwin	Speck
6:00 - 7:00	DINNER		
7:00 - 8:30	Fluorescence Microscopy - Theory & Practice	Shah	Speck
8:30 - 11:30	Fluorescence Microscopy Laboratory	Shah/W.Salmon/ Commercial Faculty	Main lab
Friday, 5/5/2017			
8:45 - 9:00	Daily Overview	Taraska	Speck
9:00 – 10:30	Electronic Imaging and Digital Image Processing I	Swedlow	Speck
10:30 - 12:00	Quantitative Laboratory	Swedlow/Maddox/ Taraska/W. Salmon	Main lab
12:00 - 1:00	LUNCH		
1:00 - 3:00	Quantitative Laboratory, cont	Swedlow/Maddox/W. Salmon	Main lab

3:00 - 4:00	Discussion of Quantitative Laboratory	Swedlow/Maddox/W. Salmon	Main lab
4:00 - 5:30	Cameras for Low Light Level Imaging	Maddox	Speck
5:30 - 7:00	DINNER		
7:00 - 8:00	Ethics of Image Processing Guided Roundtable Discussion	W. Salmon/ Shah/ Taraska	Main Lab
8:00 - 11:30	Low Light Level Imaging and Signal Quantification Laboratory	Maddox/Commercial Faculty	Loeb var.
Saturday, 5/6/2017			
8:45 - 9:00	Daily Overview	W. Salmon	Speck
9:00 - 10:00	Polarized light microscopy	T. Salmon	Speck
10:00 - 11:30	Polarized light laboratory	Sluder/Commercial Faculty	Main Lab
11:30 - 12:30	DIC Lecture	T. Salmon	Speck
12:30 - 1:30	LUNCH		
1:30 - 4:00	DIC & Enhanced DIC laboratory	Sluder/Commercial Faculty	Main lab
4:00 - 5:00	Fourier Optics	Shah/Kner	Speck
5:00 - 6:00	Abbe Demo	McIlvain	Main Lab
6:00 - 7:00	DINNER		
7:00 - 8:00	Digital Image Processing II	Swedlow	Speck
8:00 - 10:30	Image Processing Laboratory	Swedlow/Maddox/ Commercial Faculty	Main lab
10:30 - 11:00	Discussion of imaging processing and quantitative measurements	Swedlow/Maddox	Main lab
Sunday, 5/7/2017			
8:45 - 9:00	Daily Overview	Shah	Speck
9:00 - 10:30	Fluorescent Probes and Proteins	Campbell	Speck
11:00 - 12:00	Live Cell Imaging	W. Salmon	Speck
12:00 - 1:00	LUNCH		
1:00 - 5:00	Fluorescent Protein and Live Cell Imaging Laboratory	Campbell/ W. Salmon/ Commercial Faculty	Loeb var.
5:00 - 6:00	FRET, BioSensors, FLIM	Taraska	Speck
6:00 - 7:00	DINNER		
7:00 - 10:30	FRET Laboratory	Shah/Commercial Faculty	Loeb var.
10:30 - 11:00	Discussion of FRET Laboratory	Shah/Commercial Faculty	Main lab
Monday, 5/8/2017			
8:45 – 9:00	Daily Overview	Taraska	Speck
9:00 - 10:00	3D Microscopy I: The Problems and a Wide-Field Solution	Shaw	Speck
10:00 - 12:00	Deconvolution Laboratory Exercises	Shaw/ Commercial Faculty	Loeb Var.
12:00 - 1:00	LUNCH		
1:00 – 2:00	3D Microscopy II: Point-scanning Solutions and Their Problems	Shaw	Speck
2:00 – 5:00	Confocal and Multiphoton Laboratory Exercises	Shaw/ Commercial Faculty	Loeb var.
5:00 - 5:30	3D Microscopy Discussion I	Shaw/ Commercial Faculty	Main lab
5:30 - 7:00	DINNER		

7:00 – 8:00	3D Microscopy III: Analysing Performance and Choosing Methods	Shaw	Speck
8:00 - 11:00	Quantitative Evaluation of Performance in 3D Microscopy	Shaw/ Commercial Faculty	Loeb var.
11:00 - 11:30	3D Microscopy Discussion II	Shaw/ Commercial Faculty	Main lab
Tuesday, 5/9/2017			
8:45 – 9:00	Daily Overview	W. Salmon	
9:00 - 10:00	TIRF and single molecule detection	Taraska	Speck
10:00 - 1:00	TIRF Laboratory	Taraska	Loeb var.
1:00 - 2:00	BAG LUNCH		
2:00 - 3:00	Light Sheet Microscopy Lecture	Kumar	Speck
3:00 - 6:00	Light Sheet Laboratory	Kumar/Commercial Faculty	Various
6:00 - 7:00	DINNER		
7:00 - 8:00	Structured Illumination Microscopy	Kner	Speck
8:00 - 11:00	Structured Illumination Microscopy Laboratory	Kner/Commercial Faculty	Various
Wednesday, 5/10/2017			
8:45 - 9:00	Daily Overview	Shah	Speck
9:00 - 10:00	Localization Microscopy Lecture	Sochacki	Speck
10:00 - 1:00	Localization Microscopy Laboratory	Sochacki/Commercial Faculty	Loeb var.
1:00 - 2:00	BAG LUNCH		
2:00 - 5:30	FREE TIME - Student samples, MBL optics		
5:30 - 7:00	DINNER		
7:00 - 10:00	Analysis Laboratory (CellProfiler/ImageJ)	Arena/ Karhohs	Loeb var.
Thursday, 5/11/17			
8:45 - 9:00	Daily Overview	W. Salmon	Main Lab
9:00 - 12:00	Analysis Laboratory (ImageJ/CellProfiler)	Arena/ Karhohs	Loeb var.
12:00 - 1:00	LUNCH		
1-2:30	Computer-hardware communication, open source microscope control	Stuurman	Main Lab
2:30 - 5:30	Machine Learning for Image Processing Laboratory	Arena/ Karhohs	Loeb var.
5:30 - 6:30	Reception		
6:30 - 8:00	Course Dinner	ALL	Swope - Meigs room
8:00 - 9:00	Dessert - Inoué Lecturer	Gladfelter	Swope - Meigs room
Friday, 5/12/17			
9:30	Pasteries and coffee		Auditorium Foyer
10:00-11:00	Frontiers in Imaging	Boyden	Speck Auditorium
11:00 - 12:00	Lunch and departure		