

Module 1: Microscopy, Arthropods (June 2- June 7)		
6/01/25 (Sun1)	Reception & Dinner, 7pm 2 nd Floor Loeb 256	Tatjana Piotrowski , (Stowers); Athula Wikramanayake , (Univ. Miami), <i>Welcome and course overview. Bring your posters</i>
6/02/25 (Mon)	Morning lecture (9-11am) Speck Auditorium	Athula Wikramanayake , (Univ. Miami). Evolution of metazoan body plans. Nipam Patel (MBL) Key concepts in development as seen through <i>Drosophila</i> embryogenesis
	Afternoon lecture and lab (1pm) Speck Auditorium (Rowe)	Lecture: Lisa Cameron , (Duke U.), Michelle Itano , (UNC), Paula Montero Llopis (Harvard), <i>Light and confocal microscopy</i> Lab: Looking at fly embryos
	Loeb Lab (3:15pm)	Lab: Imaging Modalities: Lisa Cameron, (Duke U.), Paula Montero Llopis (Harvard), Carsten Wolff and Rylie Walsh
	Evening lab (7:30pm)	Imaging Modalities; Lisa Cameron , (Duke U.), Paula Montero Llopis (Harvard), Carsten Wolff (MBL) and Rylie Walsh (MBL)
6/03/25 (Tue)	Morning lecture (9-11am) Speck Auditorium	Nipam Patel (MBL) Establishment of the <i>Drosophila</i> body plan Melanie Worley (UVA) Growth and patterning during post-embryonic development of <i>Drosophila</i>
	Afternoon lab (1pm)	<i>Drosophila</i> larval analysis; Dissection of additional arthropods, and continued analysis of <i>Drosophila</i> unknown stains. Students begin their own antibody and in situ stains to familiarize themselves with handling samples and these techniques
	Evening lab (7:30pm) microscopy lab	Continue working on larvae and other arthropods and visualization and analysis using unknown stains Introduction of small group projects
6/04/25 (Wed)	Morning lecture (9-11am) Speck Auditorium	Melanie Worley (UVA) Regeneration in <i>Drosophila</i> Heather Bruce (UBC-Vancouver) Arthropod appendages: homology and novelty over half a billion years
	Afternoon (1:30pm) & evening labs (7:30pm)	<i>Arthropod Lab continued</i> Students complete their own initial stains; and begin small group projects Student presentations of <i>Drosophila</i> unknowns
6/05/25 (Thu)	Morning lecture (9-11am) Speck Auditorium	Guilherme Gainett (Boston Children's Hospital and Harvard Medical School), Visual system diversification in arachnids: eye loss and major transitions in eye types Prashant Sharma (University of Wisconsin, Madison) Analyses of genome architecture and comparative development break impasses in the evolutionary biology of "Arachnida"
	Afternoon (1:30pm) & evening labs (7:30)	<i>Arthropod Lab continued; continue group projects</i> Evening Lecture: Butterfly wing coloration and tour of butterfly collection
6/06/25 (Fri)	Morning lecture (9-11am) Speck Auditorium	Anyi Mazo-Vargas (Duke U.), <i>Diving into butterfly wing patterning: Understanding genomic organization and signals driving diversity</i> Lesley Weaver (Indiana University), <i>Drosophila</i> as a model to understand inter-organ communication
	Afternoon (1:30pm) & evening labs (7:30pm)	<i>Arthropod Lab continued; continue group projects</i>
6/07/25 (Sat)	Morning lecture (9-11am) Speck Auditorium	Michalis Averof (Lyon) <i>Perfect regeneration of a complex organ; does regeneration mirror development?</i> (Rose lecture)
	Afternoon (1:30pm) & evening labs (7:30pm)	<i>Arthropod Lab continued; complete group projects</i>
6/08/25 (Sun)	5:00pm 7:00pm	Scavenger hunt Course dinner
Things to do this week: T-shirt design for class, softball t-shirt, parade committee		

Module 2: Nematodes, Annelids, Acoels (June 9- June 14)		
6/09/25 (Mon)	Morning lecture (9-11am) Speck Auditorium	Dave Sherwood , (Duke), <i>Introduction to C. elegans, and The ins and outs of oocyte to zygote transition</i>
	Afternoon & evening labs	<i>C. elegans</i>
6/10/25 (Tue)	Morning lectures (9-11am) Speck Auditorium	Geraldine Seydoux , (Johns Hopkins/ HHMI), Ethel Browne Harvey lecture, <i>Assembly and function of germ granules</i> . Dan Dickinson (UT Austin), <i>Establishing and regulating cell polarity in the early C. elegans embryo</i>
	Afternoon lab	<i>C. elegans</i> .
6/11/25 (Wed)	Morning lecture (9-11am) Speck Auditorium	Student symposium (5min talk, 2 min questions). Meigs Room next to Dining Hall.
	Afternoon & evening labs	<i>C. elegans</i> . Library/MRC tour.
6/12/25 (Thu)	Morning lecture (9-11am) Speck Auditorium	Duygu Özpolat (Wash U, St. Louis. Zoom lecture), <i>Cellular mechanisms of regeneration in annelids</i> Elaine Seaver , (Whitney Laboratory for Marine Bioscience), <i>Embryology and regeneration: an annelid perspective</i>
	Afternoon & evening lab	<i>Annelids (C. elegans)</i>
6/13/25 (Fri)	Morning lecture (9-11am) Speck Auditorium	Mansi Srivastava , (Harvard), <i>The evolution of regeneration and stem cells: the acoelomorph perspective</i> ; and, <i>Plasticity across development and evolution</i>
	Afternoon & evening labs,	<i>Acoels (C. elegans, annelids)</i> . 8pm Friday evening lecture (voluntary)
6/14/25	10am	Tour marine invertebrate culture center

(Sat)	Afternoon & evening labs	<i>C. elegans, acoels, annelids,</i>
	Class presentations (9pm)	<i>Show 'n Tell 1; lab clean up</i>
6/15/25 (Sun)	<i>Free time</i>	
Module 3: Basal deuterostomes and spiralian (June 16- June 21)		
6/16/25 (Mon)	Morning lecture (9-11am) Speck Auditorium	Athula Wikramanayake , (Univ. Miami), <i>Introduction to echinoderms and early patterning</i> Zak Swartz , (MBL), <i>A (sea) star is born: oogenesis and early development in a changing ocean</i>
	Afternoon & evening labs	<i>Marine Resource Center tour and tour of Loeb. (1-3PM) schedule!</i> Jon Henry , (MBL), Zak Swartz (MBL), Margherita Perillo (MBL), Athula Wikramanayake (UMiami), <i>Tool making & microinjection (use echinoderms to practice microinjections)</i> (3-6PM)
6/17/25 (Tue)	Morning lecture (9-11am) Speck Auditorium	Laurinda Jaffe (University of Connecticut)(Lillie lecture) <i>Fertilization and the activation of development</i> Margherita Perillo , (MBL), <i>Sea stars and sea cucumbers as models for organogenesis.</i>
	Afternoon & evening labs	<i>Echinoderms. Sea stars</i>
6/18/25 (Wed)	Morning lecture (9-11am) Speck Auditorium	Bob Zeller , (San Diego State Univ.), <i>Introduction to ascidian development - sea squirts made easy.</i> Ed Munro , (Univ. Chicago), <i>Coupling cell fate and morphogenesis in Ascidians</i>
	Afternoon & evening labs	<i>Echinoderms, ascidians.</i> Athula Wikramanayake , (Univ. Miami) and Tatjana Piotrowski , (Stowers Institute),
	Evening discussion	Ethics Discussion- authorship and navigating mentor/mentee relationships
6/19/25 (Thu)	Morning lecture (9-11am) Speck Auditorium	Ed Munro , (Univ. Chicago), <i>Dynamics of neural tube closure in ascidians</i> Alberto Stolfi (Georgia Tech), <i>A conserved RNA switch for acetylcholine receptor clustering at neuromuscular junctions in chordates</i>
	Afternoon & evening labs	<i>Ascidians (echinoderms)</i>
	evening lecture (fish bowl)	Jon Henry (MBL). <i>Twists and turns of spiralian developmental biology</i>
6/20/25 (Fri)	Morning lecture (9-11am) Speck Auditorium	Dede Lyons (Scripps Institute of Oceanography)(Kessel Lecture), <i>Developmental origins of molluscan novelties</i>
	Afternoon & evening labs	<i>Spiralians (echinoderms, tunicates). 8pm Friday evening lecture (voluntary)</i>
6/21/25 (Sat)	Morning lecture (9-11am) Speck Auditorium	Elia Benito- Gutierrez (Univ. of Cambridge, UK). <i>Cephalochordates, Amphioxus.</i>
	Afternoon & evening labs	<i>spiralians, tunicates, echinoderms</i>
6/22/25 (Sun)	Morning and Afternoon	<i>Free time</i>
	Evening lecture (8pm)	Elke Ober (FAU Erlangen, Germany). <i>Introduction to ZF development</i>
Module 4: Fish and Frogs (June 23- June 28) (Please note that there will be morning and evening labs, and afternoon lectures this week)		
6/23/25 (Mon)	Morning lab (9am)	<i>Zebrafish</i>
	Afternoon lecture (1-3pm) Speck Auditorium	Tatjana Piotrowski , (Stowers Institute), <i>Zebrafish intro; sensory lateral line development/regeneration</i>
	Evening lab (7:30-8:30pm)	<i>Zebrafish/ frog lab intro</i>
6/24/25 (Tue)	Morning lab	<i>Zebrafish, Frogs</i>
	Afternoon lecture (1-3pm) Speck Auditorium	John Wallingford (Univ. of Texas, Austin), <i>What 25 years of vertebrate Planar Cell Polarity hasn't taught us</i>
	Evening lab	<i>Zebrafish, Frogs</i>
6/25/25 (Wed)	Morning lab	<i>Zebrafish, Frogs</i>
	Afternoon Lecture (1-3pm) Speck Auditorium	Elke Ober , (FAU Erlangen, Germany), <i>Building an organ - liver development and regeneration</i>
	Evening lab	<i>Frogs, Zebrafish</i>
6/26/25 (Thu)	Morning lab	<i>Frogs, Zebrafish</i>
	Afternoon lecture (1-3pm) Speck Auditorium	Andrea Wills , (Univ. Washington), <i>Decoding the transcriptional and metabolic requirements for vertebrate regeneration</i> Shinuo Weng (Johns Hopkins University), <i>Decoding multiscale biomechanics in convergent extension</i>
	Evening lab	<i>Frogs, Zebrafish</i>
6/27/25 (Fri)	Morning lab 10:30am	<i>Zebrafish, Frogs</i>
	Afternoon lecture (1-3pm) Speck Auditorium	Marina Venero-Galanternik (University of Utah), <i>Anatomical and molecular characterization of the zebrafish meninges</i> Andrew Gillis , (MBL) <i>Skate development and evolution of the vertebrate skeleton</i>
	Evening lab	<i>Zebrafish, Frogs, Skates. 8pm Friday evening lecture (voluntary)</i>
06/28/25 (Sat)	Morning lab	<i>Zebrafish, Frogs</i>
	11am	<i>Fish room tour with Elke Ober</i>
	Afternoon lecture 1:30pm Speck Auditorium	Dan Rokhsar (UC Berkeley)(Rafferty lecture), <i>The past has left its traces on the world: deeply conserved synten and the evolution of animals</i>
	Evening lab	<i>Zebrafish, Frogs</i>

	Class presentations 8pm	Show 'n Tell 2; lab clean up
06/29/25 (Sun)		Whale watching trip to Hyannis
Module 5: Chicks and Mouse (June 30- July 5)		
6/30/25 (Mon)	Morning lecture (9-11am)	Peter Lwigale (Rice University), <i>Introduction to avian development</i>
	Speck Auditorium	Tatjana Sauka-Spengler , (Stowers Institute), <i>Gene Regulatory Networks</i> .
	Afternoon & evening labs	<i>Chick</i>
7/1/25 (Tue)	Morning lecture (9-11am)	Richard Behringer (MD Anderson). <i>Introduction to mouse development/sex development</i>
	Speck Auditorium	
	Afternoon & evening labs	<i>Mouse (chick). 7:30pm. Molecular Instruments talk HCR. Fish bowl.</i>
7/2/25 (Wed)	Morning lecture (9-11am)	Ondine Cleaver (UTSW), <i>Introduction to mouse development and development of the vascular system</i>
	Speck Auditorium	
	Afternoon & evening labs	<i>Chick and mouse</i>
7/3/25 (Thu)	Morning lecture (9-11am)	Stephan Grill (Max-Planck-Institute Dresden, Germany; Katsuma and Jean Dan lecture hosted by Physiology). <i>Physics of Structure Formation in Living Systems</i> .
	Clapp Auditorium	
	Afternoon & evening labs	<i>Chick and mouse</i>
7/4/25 (Fri)	July 4 th Parade	<i>Free time, parade. Course BBQ next to white tent at 6pm and watch fireworks on beach.</i>
7/5/25 (Sat)	Morning lecture (9-11am)	Peter Lwigale (Rice University), <i>Partnering of Periocular Neural Crest Cells during Ocular Development</i>
	Speck Auditorium	Marcos Simoes-Costa (Harvard University), <i>The avian embryo as a model for developmental genomics</i>
	Afternoon/evening labs	<i>Chick and mouse, softball game, After game BBQ</i>
7/6/25 (Sun)	Free time	
Module 6: Cephalopods, Cnidarians, Ctenophores (July 7- July 12)		
7/7/25 (Mon)	Morning lecture (9-11am)	Carrie Albertin (MBL) <i>Evolution and development of cephalopod brains and body plans</i>
	Speck Auditorium	
	Afternoon	<i>Cephalopods</i>
	evening lab	<i>Cephalopods, squid injections.</i>
7/8/25 (Tue)	Morning lecture (9-11am)	Celina Juliano (UC Davis), <i>Mechanisms of development and regeneration in Hydra</i> .
	Speck Auditorium	
	Afternoon & evening labs	<i>Cnidarians, Nematostella</i>
7/9/25 (Wed)	Morning lectures (9-11am)	Matt Gibson , (Stowers Institute), <i>Anthozoan overview: The biology of sea anemones and reef building corals, and. Your inner anemone: segments, somites, and the evolution of animal metamerism</i>
	Speck Auditorium	
	Afternoon & evening labs	<i>Cnidarians, Nematostella</i>
7/10/25 (Thu)	Morning lecture (9-11am)	Bill Browne (Univ. Miami), <i>Using Mnemiopsis as a model to investigate ctenophore innate immunity</i>
	Speck Auditorium	Athula Wikramanayake (Univ. Miami), <i>The evolution of signaling pathways: insights from Wnt/beta-catenin signaling in non-bilaterians</i>
	Afternoon labs (1:30PM)	<i>Ctenophores (cnidarians, cephalopods). HP visit.</i>
	Evening labs	<i>Ctenophores (cnidarians, cephalopods)</i>
7/11/25 (Fri)	Morning lecture (9-11am)	Olivier Pourquie (Harvard) (Saunders lecture). <i>Laying down the body plan: lessons from the embryo, and Deconstructing and reconstructing the human musculo-skeletal system in vitro with pluripotent stem cells.</i>
	Speck Auditorium	
	Afternoon & evening labs	<i>Cnidarians (ctenophores, cephalopods). 8pm Friday evening lecture (voluntary)</i>
7/12/25 (Sat)	Morning lecture (9-11am)	Neil Shubin (UChicago)
	Speck Auditorium	
	Afternoon labs	<i>cnidarians, ctenophores, cephalopods</i>
	Class presentations, (8pm)	<i>Show 'n Tell 3</i>
7/13/25 (Sun)	Morning discussion (11am)	Athula Wikramanayake , (Univ. Miami) and Tatjana Piotrowski (Stowers Institute)
	Afternoon lab	<i>Lab clean-up</i>
	Evening (7:30pm)	<i>Course banquet and award ceremony</i>