

Day 1

Day	Time	Activity	Instructor
Mon.	All day	Students arrive	

Day 2

Day	Time	Activity	Instructor
Tues.	7:30	Continental Breakfast Mezzanine	NCMA
Tues.	8:30	Welcome and Introductions: <ul style="list-style-type: none"> • Safety Practices & Training • Domestic issues (food breaks, bathrooms, accommodation, emergency drills). • Introductions; What do you want to get out of the course (survey summary) • Course outline/syllabus/manual • Internet access, course resources on website. • An introduction to Bigelow Laboratory & NCMA 	Sara Rauschenberg Mike Lomas
Tues.	11:00	Tour of NCMA, Greenhouse, and seawater Facility	Mike Lomas
Tues.	12:00	Lunch on Mezzanine	EBBGS
Tues.	13:00	Introduction to lab/materials/supplies Microscope 101 - Lecture and demo on using microscopes and iOS device	Mike Lomas Bigelow IT
Tues.	13:45	Laboratory Demonstration Student Stations & prep for the week ahead. <ul style="list-style-type: none"> • About alcohol burners and other material at each student station • Make pipette mouth pieces <ul style="list-style-type: none"> ○ Drawing micropipettes from Pasteur pipettes & capillaries • Sterile technique exercise. <ul style="list-style-type: none"> ○ Pipetting into organic media ○ Testing benches, work areas with agar plate ○ Testing Pipetmen for utility and sterility 	Pete Countway

Day	Time	Activity	Instructor
Tues.	14:45	Laboratory Demonstration <ul style="list-style-type: none"> • Isolation techniques – picking cells (fresh sample and L1 for this exercise) – set up microtiter plates for isolation. • Carm’s ‘cell sucker’ system • Microcapillary cell picking • Dilution-Extinction isolation • Set up plates for culturing • Discuss axenic vs. bacterized (xenotobiotic) cultures • Bacteria freeing, pros and cons 	Carm Tomas & Pete Countway
Tues.	15:45	Coffee Break	
Tues.	16:00	Lecture/Lab: Principles of Flow Cytometry, Cell Sorting and discussion of different counting methods. <ul style="list-style-type: none"> • Monitoring Algal Growth <ul style="list-style-type: none"> ○ Hemocytometer ○ Fluorometer ○ Flow Cytometry ○ Growth curves 	Nicole Poulton
Tues.	18:00	Dinner on your own	

Day 3 LUNCH SPONSORED BY...

Day	Time	Activity	Instructor/Vendor
Wed.	7:30	Continental Breakfast on Mezzanine	NCMA
Wed.	8:15	Meet at Bigelow dock for ½ day cruise	R/V Snow Goose
Wed.	8:30	Sampling Trip (Damariscotta river) <ul style="list-style-type: none"> • FlowCam demo in the field • GoFlo (bottle) casts to profile and collect phytoplankton • Plankton tows to collect phytoplankton • Environmental measurements (temp/salinity) via CTD 	Pete Countway Carm Tomas Harry Nelson & Frances (FIT) NCMA staff
Wed.	12:30	Lunch on the mezzanine	EBBGS
Wed.	13:30	Laboratory Demonstration <ul style="list-style-type: none"> • FlowCam Demo and analysis of sampling trip samples. • Picking cells from cruise collections for culture isolation and genetic identification 	Harry Nelson (FIT) Carm Tomas Pete Countway
Wed.	15:00	Break	

Day	Time	Activity	Instructor
Wed.	15:30	Laboratory Demonstration <ul style="list-style-type: none"> • Continue with isolations • Identification of field isolates via microscopy • Lysis of single-cell isolates for later whole genomic amplification (WGA) & PCR • Whole genome amplification setup 	Carm Tomas Pete Countway
Wed.	18:00	Dinner on your own	

Day 4

Day	Time	Activity	Instructor
Thurs.	7:30	Continental Breakfast on Mezzanine	NCMA
Thurs.	8:30	Lecture: History of Seawater Media Early Attempts of media making – <ul style="list-style-type: none"> • Erd schriber • The Provosoli & Guillard eras • Defined media – • Enriched sea water media Preparing sea water for media <ul style="list-style-type: none"> • Filtration – filter types and effective pore sizes • Sterilization – methods • Processing glassware • Matter of salinity • Routine Media for maintaining numerous cultures Formats for cultivation <ul style="list-style-type: none"> • Batch modes • Semi-continuous • Turbidostats • Chemostats 	Carm Tomas
Thurs.	10:15	Break	
Thurs.	10:30 NCMA media room	Laboratory Demo – Making culture medium (1/2 of class)	Joan Blanchette
Thurs.	10:30 Ocean modular lab	Laboratory Demo – Impact of differential media enrichments – Microscopy (1/2 of class) <ul style="list-style-type: none"> • Cell picking/isolations from enrichments 	Mark Hurd Pete Countway
Thurs.	12:00	Lunch on Mezzanine	EBBGS

Day	Time	Activity	Instructor
Thurs.	13:00 NCMA media room	Laboratory Demo – Making culture medium (other 1/2 of class)	Joan Blanchette
Thurs.	13:00 Ocean modular lab	Laboratory Demo – Impact of differential media enrichments – Microscopy (other 1/2 of class) <ul style="list-style-type: none"> • Cell picking/isolations from enrichments 	Mark Hurd NCMA staff
Thurs.	14:30	Break	
Thurs.	15:00	Lecture/Lab: Taxonomy How to use ‘Identifying Marine Phytoplankton’ Book and discussion on Morphological Taxonomy. <ul style="list-style-type: none"> • Microscopic analysis of NCMA strains from the book (see separate handout). 	Carm Tomas NCMA staff
Thurs.	cont.		
Thurs.	16:30	<ul style="list-style-type: none"> • PCR setup of WGAs with 18S rRNA gene primers 	Pete Countway
Thurs.	18:00	Dinner on your own	
Thurs.	20:30	Circadian rhythms lecture and bioluminescence demonstration	Mike Lomas
Thurs.	15:00	Lecture/Lab: Collecting & Counting Samples <ul style="list-style-type: none"> • How to collect samples <ul style="list-style-type: none"> ○ Grabs, net tows, & pumps ○ Other methods • On site data needed <ul style="list-style-type: none"> ○ Temperature & salinity ○ Other variables • How to store samples until arriving to the laboratory • How to ship samples to offsite lab • To preserve or not preserve – that is the question! • Methods – <ul style="list-style-type: none"> ○ Chambers – <ul style="list-style-type: none"> • Sedwick Rafter Cells 1 ml • Palmer Maloney 0.1 ml • Haemocytometers ○ Settling methods <ul style="list-style-type: none"> ○ Movable settling chambers ○ Fixed chambers • Care and cleaning 	Carm Tomas (Link back to Wednesday sampling trip)

Day 5

Day	Time	Activity	Instructor
Friday	7:30	Continental Breakfast on Mezzanine	NCMA
Friday	8:30	Lecture/Lab: Culturing continued <ul style="list-style-type: none"> • Other methods – Antibiotic drop cleaning • Antibiotic wash methods • Agar plate techniques • Phototaxis • Gravity separation Culture accounting techniques <ul style="list-style-type: none"> • Assigning tentative names • Culture codes, keeping records • Sharing cultures – Purification Methods <ul style="list-style-type: none"> • Droop Method • Antibiotic plates • Antibiotic suite on bucket of seawater 	Carm Tomas
Friday	10:00	Break	
Friday	10:30	Laboratory Demonstration <ul style="list-style-type: none"> • Transferring cultures • Working with agar plates, transferring colonies to growth medium. • Streaking out stocks on agar plates/slants 	NCMA staff Pete Countway
Friday	12:00	Lunch on Mezzanine	
Friday	13:00	Laboratory Demonstration Cryopreservation (group A)	Mark Hurd NCMA staff
Friday	13:00	Laboratory Demonstration PCR isolation for ID (group B)	Pete Countway
Friday	14:30	Break	
Friday	15:00	Laboratory Demonstration Cryopreservation (group B)	Mark Hurd NCMA staff
Friday	15:00	Laboratory Demonstration PCR isolation for ID (group A)	Pete Countway
Friday	17:00	Happy hour – meet at Boothbay Craft Brewery to talk about algae and enjoy a tasty local beverage	Everyone
Friday	19:00	Dinner on your own	

Day 6

Day	Time	Activity	Instructor
Sat.	7:30	Continental Breakfast on Mezzanine	NCMA
Sat.	8:30	Lecture/Data analysis Phytoplankton Molecular Taxonomy & DNA-based identifications <ul style="list-style-type: none"> • BLAST sequences from single-cell isolates 	Pete Countway
Sat.	9:45	Break	
Sat.	10:00	Lecture - Mass Culture Laboratory Demonstration <ul style="list-style-type: none"> • SeaCAP bag setup • Photobioreactors in greenhouse 	Mike Preston Pete Countway
Sat.	12:00	Lunch on Mezzanine	
Sat.	13:00	Laboratory Demonstration Harvesting large volumes <ul style="list-style-type: none"> • Centrifuge • TFF • Spray drying 	Mike Preston Pete Countway
Sat.	15:00	Break	
Sat.	15:30	Course wrap up <ul style="list-style-type: none"> • Finish mass culture demonstrations and related harvesting activities • Packing up algal isolates for shipment/transport • Final Q&A session 	Mike Preston Pete Countway Carm Tomas Mike Lomas
Sat.	18:00	Lobster Bake at Bigelow Dorm Certificate of Completion presentations	Everyone