

Daily syllabus

Beam Reach program

Spring, 2009: March 30 – June 06

Ocean 360: Marine Field Research & Ocean 365: Practicing Sustainability Science

Research theme: Acoustic investigation of orcas, their prey, and their environment

Instructors:

Dr. Jason Wood (Lead)
Dr. Val Veirs
Dr. Scott Veirs
Captain Todd Shuster
Captain Mike Kramer

Students:

Erica Beneze
Hannah McGowan
Hilary Rollins
Peter Valenzuela
Matthew Williams

The Beam Reach under/graduate program is an intensive 10-week research and educational experience. The curriculum integrates two courses, Ocean 360 & 365 and is described in detail at <http://beamreach.org/curric/>

This syllabus articulates how the general curriculum is implemented with a focus on acoustics and endangered killer whales of the Pacific Northwest. As it describes day-to-day activities in the future, the syllabus is (of course) always under construction. You may want to utilize the on-line version to access hyperlinks; it is available (in the most updated form) at http://docs.google.com/Doc?id=dg73qkwb_131fmsvq8f7

We encourage you to re-visit the online version frequently and to keep abreast of the expectations, plans, readings, assignments, and opportunities as they evolve. We may alter this syllabus at any time.

Class structure:

Our general approach is to concentrate relatively structured, formal classroom work in the mornings. Typical morning activities will include lectures, guest presentations, demonstrations, discussions, small-group activities, etc. The afternoon sessions will generally be more freeform and informal, commonly involving lab exercises, field trips, group discussions, conversations, independent or small group work, practices, trainings, etc.

Jason will be present during most classes and sessions on land. Val lives on San Juan Island and will participate as an instructor throughout the program. Scott will assist the instructor team by coordinating the program from Seattle and by teaching during key portions of the program.

Jason and Todd or Mike will be aboard while at sea and will facilitate a daily class for 2 hours in the morning, Monday—Saturday. Val, Scott, and/or a guest scientist will also be aboard intermittently to conduct research, collaborate, or supplement class presentations. Along with your classmates, you will share a rotating responsibility for daily class-time reports on ship systems, weather, navigation, science, etc.

Advisory meetings:

You will meet at least weekly as an individual student with an advisor. The intent of the meeting is to help you successfully achieve the educational outcomes of the Beam Reach program, with special attention directed at guiding you through the research process and mitigating any personal challenges that arise for you. We expect the meetings to range from vigorous discussions of your research interests and ideas to thoughtful conversation about your goals and *any* difficulties you are experiencing (academic, personal, medical, psychological, etc.)

All instructors are available to serve as general advisors and academic mentors throughout the program; however Jason and Val will be your principal mentors. Our plan is to meet with you weekly in a mentor/advisee meeting. Other willing experts can provide additional mentoring to you. Please refer to the Beam Reach handbook for other resources (other than your instructors) that you may utilize in especially difficult or emergency situations.

Learning outcomes:

As described in the introduction to the curriculum, if you successfully complete the Beam Reach curriculum, you will have mastered:

1. each step in a 10-week research collaboration with peers and a scientific mentor -- from initial questions and proposals on land, through data collection and analysis at sea, to final papers and presentations in the destination port;
2. a basic understanding of the oceanic environment, marine ecosystems, and human interaction with the sea;
3. assessment of sustainable technologies, especially those utilized on the Beam Reach vessel, and implementation of a service project that makes a marine activity more sustainable;
4. safe navigation and efficient operation of a sailing research vessel during multi-week voyages; and
5. setting and achieving personal goals, cooperating within a small group, and acting as a leader.

Assessment:

Assessment of whether you successfully achieve the learning outcomes of the Beam Reach program is accomplished through a combination of instructor, peer, and public evaluations. Here are the specific assessments, each associated with one or more of the learning outcomes. The orange background delimits assessment for Marine Field Research (Ocean 360, 10 credits); purple delimits assessment for Practicing Sustainability Science (Ocean 365, 8 credits).

Assessment (with links to rubrics)	Instructor(s)	Peers	Public
5 burning questions	10		
Proposal			
rough	40		
preliminary data product	20		
final	45		
Paper	200		
Presentation	75	25	30
Journal Club	50		
Class Exercises (7 worth 10 each)	70		
Sustainability innovation	140		
Service project	50		25
Class Exercises (2 worth 10 each)	20		
Performance of tasks	40	10	
Sailing	50		
Blogging	50		
Cooperation & Leadership	30	20	
Credit totals	890	55	55
% of credits	89.00%	5.50%	5.50%

Notes regarding the syllabus and daily schedules:

Assignments are in *red italics*; Assessments are in *bold red italics*

Abbreviations: JW Jason Wood VV Val Veirs SV Scott Veirs TS Todd Shuster MK Mike Kramer

Week 1: March 30 – April 05 (First week on land: from curiosity to proposal)

Goals and themes:

- Nurture your curiosity and develop thoughtful scientific questions. Define questions and begin draft proposal.
- Grasp broad context of orcas and their environment. Begin developing service project ideas and contacts.
- Begin thinking about acoustics, technologies available for projects, and mitigation technologies.
- Advisor meeting focus: turning questions into draft research proposal.

Assignments:

Due Thursday morning: 5 initial questions

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30
Sun 29	JW&VV sail to PT				SV & students arr P 21 questions @ ligh
Mon 30	Transboundary workshop in Port Townsend: talks from local experts				
Tue 31	Transboundary workshop in Port Townsend continued				
Wed 01	Syllabus tour: (Guide; rubrics, research project)	Computer orientation (10:30) 21 questions (continued) Review of past research & available equipment;Part I (JW)		Review of past research & available equipment; Part II: echosounder intro (VV, SV); Scott re blogging (& blog grades) and BR communication tools	Orientation to FHL Dock @ 4:00; row b intro
Thu 02	Due: 5 burning questions Discuss: Recovery plan (VV)	Acoustics: demo (VV) (PWWA meeting: Anacortes 10-2)		Library tour 2:00 Literature review (Bibliographic mngt.) Print an interesting article. (VV)	Acoustics: intro (JW)

Fri 03	Service project possibilities and partners (JW)	Acoustics Technology: dock exercise with hardware (JW, VV)		Advisor meetings / set goals Work on lit review / intro of proposals
Sat 04	row to town Visit whale museum			
Sun 05	Day off			

Week 2: April 06 – April 12 (Second week on land: develop proposal and service project)

Goals & themes:

- Ongoing exploration of instrumentation and methods available for projects
- Initiate contact with service project partners
- Advisor meeting focus: discuss proposal draft

Assignments:

Due: Thur 8:30 – first draft proposal

Due: Thur 5:30 – sound spreading ex.

Due: Fri 8:30 – stats ex. #1

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30
Mon 06	Discuss: Sound Exposure & SRKWs (JW)	Acoustics: intro continued (JW)		Acoustics: Software tutorial (JW)	Sound spreading: analysis (VV) (blue box, speaker, 2K, range finder)
Tue 07	Energy & Power: systems, science & applications (VV) (bring watts up)	Service project:(light house trip) (JW,VV)	Lime Kiln field trip	Lime Kiln cont.	
Wed 08	Intro to stats/ methods (JW)	Acoustics: software cont. Matlab (JW)	FHL lunch mtg.	Guided work on proposals	
Thu 09	<i>Due: draft proposal</i> Sound recording exercise (VV) Record/analyze acoustic data Source levels, duration, frequency	Sound recording exercise (VV) Record/analyze acoustic data Source levels, duration, frequency		Advisor meetings Work on sound spreading exercise <i>Due: sound spreading ex.</i>	
Fri 10	<i>Due: stats ex. #1</i> Discussion: “Omnivore’s Dilemma” Discuss draft proposal. Work on stats exercise #1			First knots and dinghy sailing	
Sat 11					
Sun 12					

Week 3: April 13 – 19 (Third week on land: review and revise proposal)

Goals & themes:

- Revise proposal based on advisor discussions
- Continue practicing with acoustic technologies and other equipment/methods.
- Implement service project
- Advisor meeting focus: refine draft proposal and prepare to implement it

Assignments:

Due: Wed 8:30 – Energy & Power ex.

Due: Fri 8:30 - Background noise ex.

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30
Mon 13	<i>Return rubric & reviewed proposal.</i> Sustainability: fresh & waste water in the San Juans (JW) Read through comments on proposal and start on methods.			Hydrophone calibration demo (JW) Sustainability innovation: gray water, etc.	
Tue 14	TWM staff mtg 9:00 Puget Sound Meteorology (VV)	Journal club: staff lead discussion (on 11:10 ferry to Anacortes)		Nols food rationing training / food provisioning: Mt. Vernon (return on 5:05 ferry)	
Wed 15	Sound localization (VV) Due: Energy & Power ex. Hilary, Matt and Erica @ Wolf Hollow	Sustainability: Food choices (JW)		1:00 Sustainability: power generation in the San Juans. Field trip (JW)	(bring: food for cookout, metal stakes, field tape, orange twine)
Thu 16	Acoustic masking: sound reception (JW)	have methods ready for discussion Decide order of J club		Advisor meetings Proposal work	
Fri 17	Group science and food planning Due: Background noise ex.	Metadata, science log protocols, data storage/organizing		Provisioning for week at sea	Hypothermia intro Cold plunge experience 30 Year celebration @ TWM. Start of Conservation Summit
Sat 18	Optional daylong workshops on green living at conservation summit (\$5 for lunch and workshops)				
Sun 19	Final packing and cleaning of FHL housing Conservation summit field trips			Load gear onto Gato Verde and depart FHL dock Todd on	

Week 4: April 20 – 26 (First week at sea; Guest berths: Val)

Goals & themes:

- Practice and test proposed procedures; trouble-shoot instrumentation/analysis
- Sail and safety training
- Science content: Meteorology, practical tidal theory, and navigation
- Monitor energy use on Gato Verde; compare/compete with previous years.
- Advisor meeting focus: Set ritual for positive feedback on personal factors (task, leadership, community)

Assignments:

Due : Fri 8:30 – Localization ex.

Due: Sat 8:30 – Behavior ex

	8:30 am -12:00 pm	12- 5 pm
Mon 20 TS	Safety on boat and sailing intro (TS)	Divvy up chores / set up rotations for monitoring energy data intro to energy system, waste, water, etc onboard
Tue 21 TS	Passage planning / navigation / radio use (TS)	
Wed 22 TS	Passage planning / Gato Verde propulsion/power system (TS)	Journal Club
Thu 23 TS	Passage planning Parts of a boat (MK)	Collect localization data
Fri 24 TS	Passage planning Due: Localization ex.	Advisor meetings Collect behavior data
Sat 25 TS	Passage planning Due: Behavior ex.	Re-provision/clean GV at FHL
Sun 26 MK	Passage planning	

Week 5: April 27 – May 03 (Second week at sea; Guest berths:)

Goals & themes:

- Intensify planning for sea component and evaluate land component
- Advisor meeting focus: discuss data quality, methods revision, and personal growth
- Continue exploring sustainability science

Assignments:

Due: Tues 8:30 – Hydrophone calibration ex.

Due: Fri 8:30 – Stats ex. #2

Due: Sat 8:30 – Peer evaluations

	8:30 am -12:00 pm	12- 5 pm
Mon 27 MK	Passage planning	Field testing / data trials Calibrate hydrophone
Tue 28 MK	Passage planning Due: Hydrophone calibration ex.	Distance correction testing
Wed 29 MK	Passage planning	Journal Club
Thu 30 MK	Passage planning	Acoustic methods in conservation.
Fri 01 MK	Passage planning Due: Stats ex. #2	
Sat 02 MK	Passage planning Peer evaluation due	Advisor meetings pm
Sun 03 MK	Return to FHL – clean Gato Verde	Todd departs

Week 6: May 04 – 10 (on land for single week of data analysis)

Goals & themes:

- Obtain feedback on preliminary results and refine methods and proposal accordingly
- Consider entire food chain in the Salish Sea
- Implement intermediate phases of service project

Assignments:

Due : Wed 2:00 – preliminary data products

Due : Fri 5:00 – final draft of proposal; refined field data sheet due Fri 5:00

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30
Mon 04	Mentored analysis				Mentored analysis
Tue 05	Mentored analysis	Stats and data analysis. Jim Ha		SRKW/vessel behavioral interactions. Jim Ha	Journal Club
Wed 06	Salmon & surfactants in the SJI. Russel Barsh	Mentored analysis		Preliminary data product	
Thu 07	Prototypical papers and research paper rubric Peter helping Cindy @ TWM	Guided proposal work (JW or VV give talk to BW @ LK)?		Advisor meetings	
Fri 08		Guided proposal work		Re-provisioning planning	Re-provision BR in charge of TGIFHL
Sat 09	Time off Jason &/or Val giving talks to TWM Naturalist course @ Lime Kiln?				
Sun 10	check-out by 11am Todd and GV arrive Embark in late afternoon ?				

Week 7: May 11 – 17 (Third week at sea; Guest berths: Scott: echosounder reserved from Biosonics)

Goals & themes:

- Intensify observations
- Sustainability (policy in conservation)

Assignments:

Due: Sat 8:30 – Tidal energy calculation ex.
 Due: Work on Intro & methods section of paper

	8:30 am -12:00 pm	12- 5 pm
Mon 11 TS	Passage planning	Group Science Planning: opportunities to collaborate?
Tue 12 TS	Passage planning	The orcas' physical environment (SV)
Wed 13 TS	Passage planning	Journal Club
Thu 14 TS	Passage planning	Methods of monitoring the marine environment (Physical Oceanography) (SV)
Fri 15 TS	Passage planning Global warming and marine biodiesel (SV) Meet w/ Kari,Amy,Val,Jenny, etc (JW)	Advisor meetings Grand Banks Rendezvous interaction (JW)
Sat 16 TS	Passage planning Due: Tidal energy calculation ex. FHL open house 11-4	Re-provision / clean Gato Verde Todd off; Mike on.
Sun 17 MK	Passage planning	

Week 8: May 18 – 24 (Fourth week at sea; Guest berths: Marla Holt?, Val at Portland ASA meeting)

Goals & themes:

- Continue observation and analysis
- Sustainability (human / environment interactions)
- Marine science (monitoring physical properties of the marine environment)
- Keep thinking about or working on the group service project
- Applying science to conservation

Assignments:

Due : Work on results section of paper

	8:30 am -12:00 pm	12- 5 pm
Mon 18 MK	Passage planning	
Tue 19 MK	Passage planning	Population estimates: mark recapture, distance sampling (JW)
Wed 20 MK	Passage planning	Journal Club
Thu 21 MK	Passage planning	Discussion on Island Biogeography & “Song of the Dodo” (JW)
Fri 22 MK	Passage planning	Advisor meetings
Sat 23 MK	Passage planning	Re-provision / clean Gato Verde Todd on; Mike off.
Sun 24 TS	Passage planning	

Week 9: May 25 – 31 (Fifth week at sea; Guest berths:)

Goals & themes:

- Complete observations and continue analysis
- Adding statistical rigor to results (tabular or figures)
- Ethics of authorship and data sharing
- Sustainability (humans and climate change)
- Focus of advisor meeting: strategic decisions about results, papers, and presentations

Assignments:

Due: Fri 8:30 – Peer evaluations

Due: Work on discussion section of paper

	8:30 am -12:00 pm	12- 5 pm
Mon 25 TS	Passage planning	
Tue 26 TS	Passage planning film crew?	Discuss final paper and presentation (JW)
Wed 27 TS	Passage planning Film crew?	Ethics of authorship, data sharing / collaboration (JW)
Thu 28 TS	Passage planning	Future opportunities. Next steps. (JW)
Fri 29 TS	Passage planning Peer evaluation due	
Sat 30 TS	Passage planning	Advisor meetings
Sun 31 TS	Passage planning	Disembark - clean Gato Verde Todd departs

Week 10: June 01 – 07

Goals & themes:

- Complete analysis and compose final paper
- Prepare and deliver final presentation
- Focus of advisor meeting: feedback on penultimate draft

Assignments:

Due: Wed 12:00 – penultimate draft of paper

Due: Thur 2:00 – practice talk

Due: Fri 3:30 – final presentation

Due: Fri 10pm – final draft of paper

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30
Mon 01	Group meeting to organize final week. Office Hours (by sign-up) 8:30-12; 2-5:30				
Tue 02	Office Hours (by sign-up) 8:30-12; 2-5:30			<i>Load final talk onto presentation computer and test</i>	<i>practice talk</i>
Wed 03	Office Hours (by sign-up) 8:30-12 MRC meeting: presentation?	9-12:15: ZooBot talks	Final talks 1:00-3:00		3:15-? Cellular Morphogenesis talks
Thu 04	Office Hours (by sign-up) 8:30-12	<i>By 12pm: penultimate draft of paper to advisors</i>			
Fri 05	Office Hours (by sign-up) 8:30-12				
Sat 06	Clean, pack, and tours of FHL 2-6; Group dessert and slide show?				
Sun 07	Departures and final storage/cleaning of Beam Reach equipment				