

## Daily syllabus

### Beam Reach program

Fall, 2007: August 20 – October 28

**Research theme: Acoustic investigation of orcas and their environment**

#### **Staff:**

Shannon	Fowler	Instructor
Mike	Kramer	Captain
Scott	Veirs	Program coordinator
Val	Veirs	Lead instructor
Jason	Wood	Lead instructor
Todd	Shuster	Captain

#### **Students:**

Elise	Chapman
Anne	Harmann
Elizabeth (Liz)	Hetherington
Heather	Hooper
Tim	Hunt
Ashleigh	Kemp
Wessal	Kenaio
Alexandra	Kougantakis
Kenna	Lehmann
Samantha (Sam)	Levinson

The Beam Reach undergraduate program is an intensive 10-week research and educational experience. The general curriculum which structures the program is described in detail at <http://beamreach.org/curric/>

This syllabus articulates how the general curriculum is implemented with a focus on acoustics and orcas in the Pacific Northwest. As it describes day-to-day activities in the future, the syllabus is (of course) always under construction.

Please remember that we welcome your feedback regarding the program, including the curriculum and this syllabus. In the same spirit, realize that we may alter this syllabus dramatically at any time to adapt to challenges, opportunities, your suggestions, and your interests.

### 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 and Val will both be present during most classes and sessions on land. Scott is also supporting the instructor team, partially by coordinating the program with Tracy in Seattle, and partly by teaching during key portions of the program.

Shannon will be aboard while at sea the whole time, while the lead instructors (Jason and Val) and captains (Todd and Mike) will alternate their time. They will all help facilitate a daily class for 2 hours in the morning, Monday—Saturday. 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 or Val will be assigned to you as your principle mentor. Our plan is to meet with you weekly in a one-on-one 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. how to assess and choose sustainable technologies and practices, especially those that are common in marine settings and/or are utilized on the Beam Reach vessel;
4. safe navigation and efficient operation of a sailing research vessel during a 5-week voyage; 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 demarks assessment for Marine Field Research (Ocean 360, 10 credits); purple demarks assessment for Practicing Sustainability Science (Ocean 365, 8 credits).

	Instructor(s)	Captains	Peers	Public	subtotals	Totals	% of total points
<b>5 burning questions</b>	15				<b>15</b>	545	<b>54.5%</b>
<b>Proposal</b>					<b>0</b>		
	rough				<b>35</b>		
	preliminary data product				<b>30</b>		
	final				<b>35</b>		
<b>Paper</b>	200				<b>200</b>		
<b>Presentation</b>	75		25	30	<b>130</b>		
<b>Journal Club</b>	50				<b>50</b>		
<b>Class Exercises (5 worth 10 each)</b>	50				<b>50</b>		
<b>Participation in sustainability discussions</b>	100				<b>100</b>	275	<b>27.5%</b>
<b>Sailing assessment</b>		25			<b>25</b>		
<b>Daily reports on ship systems</b>	25	25			<b>50</b>		
<b>Beam Reach impact reduction report</b>	25				<b>25</b>		
<b>Service project</b>	50			25	<b>75</b>		
<b>Performance of tasks</b>	50	20	10		<b>80</b>	180	<b>18.0%</b>
<b>Goal setting and achievement</b>	40	10			<b>50</b>		
<b>Cooperation &amp; Leadership</b>	20	10	20		<b>50</b>		
<b>Credit totals</b>	800	90	55	55	1000		
<b>% of credits</b>	80.0%	9.0%	5.5%	5.5%			

Notes regarding the syllabus and daily schedules:

**Assignments and required activities are in *red italics*; Assessments are in *bold red italics***

Abbreviations:

JW Jason Wood SV Scott Veirs VV Val Veirs SF Shannon Fowler TS Todd Shuster MK Mike Kramer  
 Ja Student team with Jason Va Student team with Val

**Week 1: August 20 – 26 (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 Tues 8:30: 5 initial questions**

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30	Evening
<b>Mon 20</b>	Lime Kiln field trip: 21 questions		Lime Kiln Lunch/Tour	2:00 computer orientation Computer checks	Syllabus tour: (Guide; rubrics)	<i>Read Conservation Plan for discussion of threats</i>
<b>Tue 21</b>	<b>Due: 5 initial questions</b> Review of past research & equipment available (Veirs, others; Beam Reach fall 05 and 06, CC; NOAA, Cascadia) 10:00 Pema on dock			Discuss Conservation plan	Literature review library tour Print an interesting article.	<i>Read: proposal rubric &amp; proposal handout; interesting article</i>
<b>Wed 22</b>	Acoustics I: intro (JW)	Acoustics II: demo (VV)		Assign advisors/groups Advisor meetings / set goals Work on lit review / intro of proposals		<i>Whale Museum Lecture 7 pm Monika Weiland</i>
<b>Thu 23</b>	Jason intro & research interests	Val intro & research interests		Service project possibilities and partners Kari Koski: Sound Watch	Guided proposal work	
<b>Fri 24</b>	Acoustics Technology: dock exercise with hardware	Planning for food acquisition and menu planning for living on Gato Verde.		Meteorology and how to create a 3 day forecast (VV)	Hypothermia intro Swim test First knots Intro to rowing	
<b>Sat 25</b>	Day off					

**Week 2: August 26 – September 01**

BLUE = Team VaTo learns to sail and deploy (sea wk 1)

GREEN = Team JaMi practices methods and develops proposals

Guest berth 1:

Guest berth 2: Scott Veirs (Wed Aug29 – Wed Sep05)

Assignments:

**Due: Wed 3:00 first draft proposal**

**Due (land): Thur: 5:30 acoustic ex #1**

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30	Evening
<b>Sun 26</b>	Day off					
	Morning off		Prepare 3 day weather forecast	GV (at FHL) load food & equipment & depart	Dinner Prep / Dinner	Safety talk / intro to Gato Verde
<b>Mon 27</b>	Lacover Farm service work including discussion re food and food prep for next week.			Advisor meetings		<i>Read: Sound Exposure and SRKWs</i>
	Voyage Planning	Equipment testing / deployment		Equipment testing / deployment	Dinner Prep / Dinner	<i>Read: Sound Exposure and SRKWs</i>
<b>Tue 28</b>		First Journal Club				
	Voyage Planning	First Journal Club			Dinner Prep / Dinner	
<b>Wed 29</b>	Acoustic software tutorial	Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast		Hand in first draft of research proposal		Joint picnic & meeting of SEA and LAND groups: Marla Holt speaking at Whale Museum Launch of trimaran?
	Voyage Planning	Hydrophone calibration		Hand in first draft of research proposal	Dinner Prep / Dinner	
<b>Thu 30</b>				Advisor meetings	Food planning for next week	

	Voyage Planning	Distance estimation exercise			Dinner Prep / Dinner	
<b>Fri 31</b>	Day off					
	Voyage Planning				Dinner Prep / Dinner	
<b>Sat 01</b>	Day off			Marketplace food purchase for next week		
	Voyage Planning				Dinner Prep / Dinner	

**Week 3: September 02 – September 08**

BLUE = Team JaMi learns to sail and deploy (sea wk 1)

GREEN = Team VaTo revises proposal and data product

Guest berth 1:

Guest berth 2: Scott Veirs (Wed Aug29 – Wed Sep05)

Assignments:

**Due (land): Fri 8:30 acoustics ex #1**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 02</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor Lecture: <i>“Methods &amp; Statistics for the Beam Reacher”</i>	Assist in food and equipment transfer	Return to FHL	
		GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	Safety talk / intro to Gato Verde
<b>Mon 03 Labor Day</b>	Lacrover Farm service work/ harvesting			Advisor meetings		<i>Read: journal club article</i>
	Voyage Planning	Equipment testing / deployment		Equipment testing / deployment	Dinner Prep / Dinner	<i>Read: journal club article</i>
<b>Tue 04</b>		Journal Club				
	Voyage Planning	Journal Club			Dinner Prep / Dinner	
<b>Wed 05</b>	Acoustic software tutorial SJMRC meeting 8:30-10:30 (tidal energy, salmon genetics, etc)?	Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast	Puget Sound Partnership: Hilary Culverwell 12-2 (2020 agenda)?	.		Joint meeting of SEA and LAND groups: Evening lecture: <i>“Associating vocalizations with individual orcas: observing, localizing, coordinating”</i> <b>Brad Hanson talking at Whale Museum</b>
	Voyage Planning	Hydrophone calibration			Dinner Prep / Dinner	
<b>Thu 06</b>				Advisor meetings	Food planning for next week	
	Voyage Planning	Distance estimation exercise			Dinner Prep / Dinner	

<b>Fri 07</b>	Day off					
	Voyage Planning				Dinner Prep / Dinner	
<b>Sat 08</b>	Day off			Marketplace food purchase for next week		
	Voyage Planning Shannon time off				Dinner Prep / Dinner	



**Week 4: September 09 – September 15**

BLUE = Team Va gathers prelim data (sea wk 2)

GREEN = Team Ja Data product and revises proposal

Guest berth 1:

Guest berth 2:

Assignments:

**Due: Wed 8:30 preliminary data product**

**Due (land): Thurs noon stats ex**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 09</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor Group science plan	Assist in food and equipment transfer	Return to FHL	
		GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	
<b>Mon 10</b>	Lacrover Farm service work/ harvesting			Advisor meetings		<i>Read: journal club article</i>
	Voyage Planning				Dinner Prep / Dinner	<i>Read: journal club article</i>
<b>Tue 11</b>		Journal Club		Statistics tutorial		
	Voyage Planning	Journal Club			Dinner Prep / Dinner	
<b>Wed 12</b>		Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast				Joint meeting of SEA and LAND groups: Evening lecture Robin Baird talking at Whale Museum
	Voyage Planning Shannon back				Dinner Prep / Dinner	
<b>Thu 13</b>		Guided proposal work		Advisor meetings	Food planning for next week	
	Voyage Planning				Dinner Prep / Dinner	
<b>Fri</b>	Day off					

<b>14</b>	Voyage Planning				Dinner Prep / Dinner	
<b>Sat 15</b>	Day off			Marketplace food purchase for next week		
	Voyage Planning				Dinner Prep / Dinner	

**Week 5: September 16 – September 22**

BLUE = SEA -- Team Ja gathers data, final prop revise (sea wk 2)

GREEN = LAND – Team Va begins data analysis, final prop revise

Guest berth 1: Jim Ha (Sept 16 – 18)

Guest berth 2:

Assignments:

**Due: Wed 8:30 final proposal**

**Due (land): Thurs 5:30 stats ex**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 16</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor Jim Ha lecture: Behaviour methods & Orca research	Assist in food and equipment transfer	Return to FHL	
		GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	
<b>Mon 17</b>	Lacrover Farm service work/ harvesting			Advisor meetings		<i>Read: journal club article</i>
	Voyage Planning	Guided proposal work			Dinner Prep / Dinner	<i>Read: journal club article</i>
<b>Tue 18</b>	Guided proposal work	Journal Club		Guided proposal work		
	Voyage Planning	Journal Club			Dinner Prep / Dinner	
<b>Wed 19</b>	Statistics tutorial	Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast				Joint meeting of SEA and LAND groups: Evening lecture Debbie Giles talking at Whale Museum
	Voyage Planning				Dinner Prep / Dinner	
<b>Thu 20</b>				Advisor meetings	Food planning for next week	
	Voyage Planning				Dinner Prep / Dinner	
<b>Fri</b>	Day off					

<b>21</b>	Voyage Planning				Dinner Prep / Dinner	
<b>Sat 22</b>	Day off			Marketplace food purchase for next week		
	Voyage Planning				Dinner Prep / Dinner	

**Week 6: September 23 – September 29**

BLUE = Team Va gathers data, co-leads watch (sea wk 3)

GREEN = Team Ja begins data analysis, paper intro, service proj

Guest berth 1: Marla Holt (Sept 23-Sept 26)

Guest berth 2: Scott Veirs (Sep26-Oct03)

Assigments:

**Due: Intro section of paper**

**Read: Excerpt from “The Song of the Dodo”**

**Due (land): acoustics ex #2**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 23</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor Acoustics III: sound transmission	Assist in food and equipment transfer	Return to FHL	
		GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	
<b>Mon 24</b>	Lacrover Farm service work/ harvesting			Advisor meetings		<i>Read: journal club article</i>
	Voyage Planning				Dinner Prep / Dinner	<i>Read: journal club article</i>
<b>Tue 25</b>		Journal Club				
	Voyage Planning	Journal Club			Dinner Prep / Dinner	
<b>Wed 26</b>		Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast				Joint meeting of SEA and LAND groups: Evening lecture Katherine Ayres Discussion of Island Biogeography and reserve design
	Voyage Planning				Dinner Prep / Dinner	
<b>Thu 27</b>				Advisor meetings	Food planning for next week	
	Voyage Planning				Dinner Prep / Dinner	
<b>Fri</b>	Day off					

28	Voyage Planning				Dinner Prep / Dinner	
Sat 29	Day off			Marketplace food purchase for next week		Val at wedding in Ore
	Voyage Planning				Dinner Prep / Dinner	

**Week 7: September 30 – October 06**

BLUE = Team Ja gathers data, co-leads watch (sea wk 3)

GREEN = Team Va analyzes data, paper methods, service project

Guest berth 1: Scott Veirs (Sep26-Oct03)

Guest berth 2:

Assignments:

**Due: Methods section of paper**

**Due (land): acoustics ex #2**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 30</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor Acoustics IV: sound production	Assist in food and equipment transfer	Return to FHL	
		GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	
<b>Mon 01</b>	Lacrover Farm service work/ harvesting			Advisor meetings		<i>Read: journal club article</i>
	Voyage Planning				Dinner Prep / Dinner	<i>Read: journal club article</i>
<b>Tue 02</b>		Journal Club				
	Voyage Planning	Journal Club			Dinner Prep / Dinner	
<b>Wed 03</b>		Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast				Joint meeting of SEA and LAND groups: Evening lecture 4:00 tour of Roche Harbor waste water treatment plant?
	Voyage Planning Shannon time off				Dinner Prep / Dinner	
<b>Thu 04</b>				Advisor meetings	Food planning for next week	
	Voyage Planning				Dinner Prep / Dinner	
<b>Fri</b>	Day off					

05	Voyage Planning				Dinner Prep / Dinner	
Sat 06	Day off			Marketplace food purchase for next week		
	Voyage Planning				Dinner Prep / Dinner	



**Week 8: October 07 – October 13**

BLUE = Team Va final data collection; leads watch (sea wk 4)

GREEN = Team Ja analyzes data, paper results, service project

Guest berth 1:

Guest berth 2:

Assignments:

**Due: initial results section**

**Read: Excerpt from “The Omnivores dilemma”**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 07</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor Acoustics V: sound reception?	Assist in food and equipment transfer	Return to FHL	
	Shannon back	GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	
<b>Mon 08</b> <b>Liz Bday!</b>	Lacrover Farm service work/ harvesting			Advisor meetings		Liz’s Birthday
	Voyage Planning				Dinner Prep / Dinner	
<b>Tue 09</b>						
	Voyage Planning				Dinner Prep / Dinner	
<b>Wed 10</b>		Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast				Joint meeting of SEA and LAND groups: Evening lecture Discussion of food and sustainability
	Voyage Planning				Dinner Prep / Dinner	
<b>Thu 11</b>				Advisor meetings	Food planning for next week	
	Voyage Planning				Dinner Prep / Dinner	
<b>Fri</b>	Day off					

<b>12</b>	Voyage Planning				Dinner Prep / Dinner	
<b>Sat 13</b>	Day off			Marketplace food purchase for next week		
	Voyage Planning				Dinner Prep / Dinner	

**Week 9: October 14 – October 20**

BLUE = Team Ja final data collection; leads watch (sea wk 4)

GREEN = Team Va analyzes data, drafts paper figures and concl

Guest berth 1: Tracy Smith (Oct Sun14-Wed17)

Guest berth 2:

Assignments:

**Due: preliminary conclusions and figures**

	8:30-10 am	10:30-12	12-3	3-4 pm	4-5:30	Evening
<b>Sun 14</b>		Load food and equipment into van Prepare 3 day weather forecast	Joint meeting of SEA and LAND groups – lunch picnic and meeting at Roche Harbor	Assist in food and equipment transfer	Return to FHL	
		GV: arrive Roche Harbor, pump out, clean etc.		GV: load food & equipment & depart	Dinner Prep / Dinner	
<b>Mon 15</b>	Lacrover Farm service work/ harvesting			Advisor meetings		
	Voyage Planning				Dinner Prep / Dinner	
<b>Tue 16</b>						
	Voyage Planning				Dinner Prep / Dinner	
<b>Wed 17</b>		Picnic Prep, Prepare for conferences with SEA partner, Prepare 3 day weather forecast				Joint meeting of SEA and LAND groups: Evening lecture Ethics of authorship, data sharing / collaboration . Future opportunities.
	Voyage Planning				Dinner Prep / Dinner	
<b>Thu 18</b>				Advisor meetings	Food planning for next week	
	Voyage Planning				Dinner Prep / Dinner	
<b>Fri 19</b>	Day off					
	Voyage Planning				Dinner Prep / Dinner	

<b>Sat 20</b>	Day off					
	Voyage Planning				Dinner Prep / Dinner	

**Week 10: October 21 – October 28 (Final analysis, paper composition, and presentations)**

Assignments:

Due: Wed 12:00pm – penultimate draft of paper

Due: Fri 10pm – final paper

	8:30-10 am	10:30-12	12-2	2-3:30 pm	4-5:30	Evening
<b>Sun 21</b>	<i>End of the SEA component! All Hands on Dock and Deck to transfer equipment and clean the ship.</i>		<i>Lunch at FHL</i>	Clean, move, unpack, store equipment		
<b>Mon 22</b>	Group meeting to organize final week. Office Hours (by sign-up) 9:30-12			Office Hours (by sign-up) 2-5:30		
<b>Tue 23</b>						
<b>Wed 24</b>	<i>By 12pm: penultimate draft of paper to advisors</i>					
<b>Thu 25</b>			<i>Team Va by 2pm: load practice talk onto presentation computer</i>	Practice talks Team Va (optional)		<i>Team Ja by 10pm: load practice talk onto presentation computer</i>
<b>Fri 26</b>	Practice talks Team Ja (optional)				<i>By 5:30: load final talk onto presentation computer and test</i>	<i>By 10pm: final draft of paper</i>
<b>Sat 27</b>	<i>Final talks:</i> 9-12 and 2-5 with public/parent lunch: 12-2 Clean, pack, and tours of FHL: 5-8 Dessert/slideshow 8pm?					
<b>Sun 28</b>	Optional day sails 8-13? (Pending ok from Todd)					Final evals to <a href="mailto:tracy@beamreach.org">tracy@beamreach.org</a> by Sunday November 5