

# MATE Center Summer Institute

## ROV Building: the SeaMATE PufferFish

July 26<sup>th</sup> – August 2<sup>rd</sup>, 2015

*Agenda*



Day 0	Sunday, July 26, 2015	
TIME	ACTIVITY	LOCATION
After 3:00 pm	Arrival Day – Check in to Hotel	Hilton Garden Inn

**All labs will be at Monterey Peninsula College, Life Science (LS) Building Room 101, unless otherwise noted.**

### Pre-workshop Homework:

- Read UW Robotics Textbook: Chapter 1, 2, Working in Water p.120-141, Chapter 6, Moving and maneuvering p. 304-309, Electric motors p.319-323, Electricity p.377-388, Transmitting power p.425-428 (7.4), Printed Circuit Boards p.440-1, Basic Control p.466-473, Payloads and hydraulics p. 534-546.
- MAKE Electronics: read experiments 1-6; soldering p.106, 107, 109, motors and magnetism p.236-241. <http://brweb.haltonrc.edu.on.ca/202204/ICE4/MAKEFULL.pdf>
- Bill Nye Electronics video <https://www.youtube.com/watch?v=7iDtUbs7vJU>

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DAY 1	Monday, July 27, 2015	MPC LS 101
TIME	ACTIVITY	Presenter
8:30 - 9:30 am	Goals for the course, logistics, and your presentation. <i>Participant Expectations: why are you here, what do you want out of this?</i>	Deidre
9:30 – 12:00 am	<ul style="list-style-type: none"> <li>• What is Technology</li> <li>• Technology in a Bag</li> <li>• What is an Engineer</li> <li>• ROV in a Bag and Motor Configurations</li> <li>• Engineering Design Process</li> </ul>	Matt Jim
<b>12:00</b>	<b>Lunch</b>	
1:00 – 1:30	Introduction to ROVs and the Mission Brief	Matt
1:30 – 2:00 pm	Design for performance and sources of design ideas	Jim
<b>2:00– 2:15</b>	<b>Break</b>	
2:15 – 5:00 pm	PVC basics and frame design. Design your Frame.	Matt Everyone

**Homework:** Review Electric motors p.319-323, Electricity p.377-388, Transmitting power p.425-428 (7.4), Printed Circuit Boards p.440-1, Basic Control p.466-473, MAKE Electronics: read experiments 1-6; soldering p.106, 107, 109, motors and magnetism p.236-241.

**Entrepreneurial Exercise:** Come up with a company name, ROV name, and tagline

MATE ROV Videos: <http://www.marinetech.org/angelfish-videos/> please look at Video 7i and look at a few others of your own choosing.

<b>DAY 2</b>	<b>Tuesday, July 28, 2015</b>	<b>MPC LS 101</b>
<b>TIME</b>	<b>ACTIVITY</b>	<b>Presenter</b>
8:30- 9:15 am	Share your frame design with the group. Tell us your company name, ROV name and tagline.	
9:15-noon	Electronics: <ul style="list-style-type: none"> <li>• Multimeters - Scott</li> <li>• Simple Circuits – Deidre</li> <li>• Batteries, fuses and power - Jim</li> </ul>	Many
<b>12:00</b>	<b>Lunch</b>	
1:00 -5:00 pm	More Electronics: <ul style="list-style-type: none"> <li>• Making a switch – Stan</li> <li>• Making a motor – Scott</li> <li>• Soldering and waterproofing wires - Matt</li> <li>• Solder a practice board - Deidre</li> <li>• Solder a PufferFish PCB and Assemble control box</li> </ul>	Many

Homework: Moving and maneuvering p. 304-309. Review Payloads and hydraulics p. 534-546.

PhET:

- <https://phet.colorado.edu/en/simulation/circuit-construction-kit-dc>
- <https://phet.colorado.edu/en/simulation/ohms-law>
- <https://phet.colorado.edu/en/simulation/resistance-in-a-wire>

<b>DAY 3</b>	<b>Wednesday, July 29, 2015</b>	<b>MPC LS 101</b>
<b>TIME</b>	<b>ACTIVITY</b>	<b>Presenter</b>
8:30 - 8:45 pm	Questions or issues?	
8:45 – 9:00am	Introduction to the SID	Matt
	Adding a fourth motor	Matt
9:00 – 10:00 am	Bollard Testing	Matt
<b>10:00–10:15 am</b>	<b>Break</b>	
10:15- noon	Adding a Camera to an ROV Why do you need a camera filter?	Jim
<b>12:00</b>	<b>Lunch</b>	
1:00-1:30 pm	Hydraulic Tools	Matt
1:30-3:00 pm	Work on your ROVs	
<b>3:00–3:15 am</b>	<b>Break</b>	
3:15-3:45 pm	Shroud designs and considerations	Jim
3:45-5:30 pm	Work on your ROVs Fill in System Check List on the board	
<b>5:30 – 6:00</b>	<b>Pizza Dinner</b>	
6:00-7:00 pm	Continue working on the ROV as needed	

Homework: Chapter 6, PhET buoyancy exercise

Tour MBARI website [www.mbari.org](http://www.mbari.org)

- What is the MBARI Mission and who defined that mission?
- What are the names of MBARIS ships, ROVs, and AUVs.
- Browse the MBARI research projects pages to get an idea of the projects underway.

<b>DAY 4</b>	<b>Thursday, July 30, 2015</b>	<b>MPC LS 101</b>
<b>TIME</b>	<b>ACTIVITY</b>	<b>Presenter</b>
8:30-8:45 am	Questions or issues?	
8:45-10:15 am	General Buoyancy Activities	Deidre
<b>10:15 am</b>	<b>Break</b>	
10:30 am	Buoyancy calculations on the ROVS <ul style="list-style-type: none"> <li>• Calculate the buoyancy of vehicle in water</li> <li>• Attach buoyancy</li> </ul>	Scott
<b>12:00</b>	<b>Lunch</b>	
1:45 pm	Depart for MBARI for field trip	
2:30 pm	MBARI Tour	MBARI
5:30 pm	Return to Monterey	

Homework:

<b>DAY 5</b>	<b>Friday, July 31, 2015</b>	<b>MPC LS 101</b>
<b>TIME</b>	<b>ACTIVITY</b>	<b>Presenter</b>
8:30 am	Questions or issues?	
8:45 – 9:15 am	The Marine Workforce	Deidre
9:15-9:45 am	MATE ROV Competitions	Jill
<b>10:00 am</b>	<b>Break</b>	
10:15 – 10:45 am	Integrating ROV activities into the classroom or club: How to get started and organized.	Jim
10:45 – 12:00 am	Moving on Up: More advanced ROV control systems Test Drive the TriggerFish ROV	Scott
<b>12:00</b>	<b>Lunch</b>	
1:00- 2:00 pm	ROV Trouble Shooting	Matt Scott
2:00 – 5:00 pm	Work on you ROVs if they are not finished	

Homework: Work on PPT presentations!

<b>DAY 6</b>	<b>Saturday, August 1, 2015</b>	<b>MPC LS 101</b>
<b>TIME</b>	<b>ACTIVITY</b>	<b>Presenter</b>
8:30-8:45 am	Questions or issues?	LS 101
9:00 – 10:00 am	Safety Checks	LS 101
<b>10:00- 11:45</b>	<b>ROV Competition Demonstration</b>	MPC Pool
<b>noon</b>	<b>Lunch</b>	LS 101
1:00 pm	Competition Debrief	LS 101
1:15 – 2:00 pm	Classroom Management (Stan)	LS 101
2:00-2:45	ROVs and the NGSS ( Emily)	LS 101
<b>6:00 pm</b>	<b>Dinner in the Sam Kara Room</b>  Participant Presentations	Sam Karas  Room

### **Departure Day, Optional trip to the Monterey Bay Aquarium**

<b>DAY 7</b>	<b>Sunday, August 2, 2015</b>	<b>MPC LS 101</b>
<b>TIME</b>	<b>ACTIVITY</b>	<b>Presenter</b>
9:00 am - ?	Monterey Bay Aquarium, Meet at Hilton Garden Inn Lobby	Monterey Bay Aquarium