# Oceans Curriculum Outline
## MS/HS

**Vision Statement:** By December, students will understand their impacts on the ocean environment & the ocean's impacts on them.

<table>
<thead>
<tr>
<th>Day</th>
<th>Topic</th>
<th>Activity Summary</th>
<th>Materials</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Welcome to SMILE</strong></td>
<td><strong>Welcome to SMILE/Intro to Oceans</strong></td>
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</tbody>
</table>
| 1 | Welcome to SMILE! - Logistics Introduction: Game-Kahoots | • Getting to Know You Icebreaker  
• Membership Form Collection *(SMILE DEADLINE 9/14/15)* (HS-check science & math courses selection)  
• SMILE Expectations *(Timelines, Attendance, Good Grades, Good Behavior)*  
• SMILE outline of year's events  
• Student Club Student Jobs (attendance, snacks, etc)  
• Field Trips (explanation and permission forms)  
• PRE-SURVEY: SURVEY MONKEY  
• Game-Kahoots: testing your knowledge on oceans  
• Science Inquiry Activity - put sea shell piece in seawater till next week - predict what will happen  
• Waters of the Earth -  
  o Tossing beach ball: Land vs water  
  o Calculating % of water on planet earth  
• Mapping oceans with rotating globe  
• Ted talks | • Handouts from SMILE website (club curriculum tab)  
• World map  
• computers/smart phones  
• Sea shell pieces  
• Artificial or real seawater  
• Ziploc quart size bags  
• Lab sheet: Sea shell sea water inquiry activity  
• Beach earth ball  
• Handouts for calculating % water on earth | | [www.uri.edu/smile - “Club Curriculum” tab](http://www.uri.edu/smile)  
[http://getkahoot.com/](http://getkahoot.com/)  
[http://education.nationalgeographic.com/mockup/?ar_a=1](http://education.nationalgeographic.com/mockup/?ar_a=1)  
**Do for next week:** Make blue ice cubes for convection demo |

| Introduction to Oceans (Lessons 2 and 4) | | | | |
| 2 | Ocean salinity  
Ocean currents | • Observe sea shell after one week (continue observations for another week)  
• **Do:** What % of water on earth is ocean: whole class activity  
• **Do:** Salinity lab: create a rainbow in a straw  
• **Read article:** Why is the ocean salty  
• **Do:** Activity on convection currents | • 2000ml blue water  
• 1 (2 liter) clear soda bottles  
• Clear cups (6)  
• Graduated cylinders (100 ml)  
• Food coloring  
• Salt: 1 container  
• Clear Straws (25) | | | [New Jersey Sea Grant](http://www.aquariumofpacific.org/downloads/ed_8ss_RainbowStacking.pdf)  
<table>
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<tr>
<th>3</th>
<th>Action</th>
<th>Description</th>
</tr>
</thead>
</table>
| 3 | Ocean acidification due to CO₂ emissions | - Do: Science Inquiry: Place sea shell into acidic solution
- Watch video on ocean acidification [https://www.youtube.com/watch?v=W0-bHt1b0sw](https://www.youtube.com/watch?v=W0-bHt1b0sw)
- Do: Students identify a gas as CO₂ by forming a white precipitate in limewater
- Do: CO₂ from breath is bubbled into bromothymol blue to indicate acidity
- Look at images of The Carbon Bathtub: Have a discussion with students |
| 3 | Computer video/student groups | - Computer video/student groups
- Straws, cups/test tubes limewater
- Straws, beakers, BTB, color chart with pH
- Vinegar
| 3 | Containers for colored saltwater | - Containers for colored saltwater
- Blue Colored ice cubes(make 12 cubes)
- Red food coloring (warmed)
- Warm water
- Plastic container (2) (convection currents)
- Rubber duck to stimulate student interest
- Handouts: Convection currents and Rubber Ducky [http://eo.ucar.edu/educators/ClimateDiscovery/ESS_lesson_3_10.19.05.pdf](http://eo.ucar.edu/educators/ClimateDiscovery/ESS_lesson_3_10.19.05.pdf) |

**Going further:**

- Have students make a hydrometer
- Co interactive on illustrating ocean and wind currents [http://oceanservice.noaa.gov/education/pd/oceans_weather_climate/media/ocean_and_wind_currents.swf](http://oceanservice.noaa.gov/education/pd/oceans_weather_climate/media/ocean_and_wind_currents.swf)
- Real live data on ocean currents [http://oceanservice.noaa.gov/facts/find-tides-currents.html#currents](http://oceanservice.noaa.gov/facts/find-tides-currents.html#currents)
- Game using currents to find treasure [http://spaceplace.nasa.gov/ocean-currents/en/](http://spaceplace.nasa.gov/ocean-currents/en/)
- Sea salt quiz [http://climate.nasa.gov/interactives/quiz_salinity/quiz](http://climate.nasa.gov/interactives/quiz_salinity/quiz)
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<tr>
<th>4</th>
<th><strong>How oceans affect the earth’s climate</strong></th>
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<tbody>
<tr>
<td><strong>Do:</strong> Check sea shell in acidic water (vinegar) from last week</td>
<td></td>
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<tr>
<td><strong>Do:</strong> Demo with balloons or watch youtube video</td>
<td></td>
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<tr>
<td><strong>Do:</strong> Investigation: How do different surfaces absorb and retain heat differently?</td>
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<tr>
<td><strong>During wait time:</strong> Read article “How do oceans soak up energy? Play Jenga Game</td>
<td></td>
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<tr>
<td><strong>4</strong></td>
<td><strong>2 balloons</strong></td>
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<tr>
<td></td>
<td><strong>match or lighter</strong></td>
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<tr>
<td></td>
<td><strong>heat lamp (1) 75 watt bulb</strong></td>
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<tr>
<td></td>
<td><strong>containers (plastic cups/beakers)</strong></td>
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<tr>
<td></td>
<td><strong>soil (potting or outside)</strong></td>
</tr>
<tr>
<td></td>
<td><strong>water</strong></td>
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<tr>
<td></td>
<td><strong>thermometers</strong></td>
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<tr>
<td></td>
<td><strong>Jenga Game</strong></td>
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<td></td>
<td><strong>Handouts: Investigation and How oceans soak up energy</strong></td>
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</table>
| | http://www.aquariumofpacific.org/downloads/ed_05551nea
genHeating.pdf |
| **Teacher note:** Order Cabomba plants for next week’s lesson. Call 1-800-334-5551 and reference order # 5858343 for cabomba that is on hold. |

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<thead>
<tr>
<th>5</th>
<th><strong>Marine Plant Photosynthesis: Earth’s main source of oxygen</strong></th>
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<tbody>
<tr>
<td><strong>4</strong></td>
<td>cabomba plants</td>
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<tr>
<td></td>
<td>test tubes</td>
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<td></td>
<td>beakers/cups</td>
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<td></td>
<td>baking soda (1%)</td>
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<td></td>
<td>wooden splints</td>
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<tr>
<td></td>
<td><a href="http://www.saps.org.uk">www.saps.org.uk</a></td>
</tr>
<tr>
<td>Virtual lab on elodea plant and photosynthesis/vesicle</td>
<td>Plankton</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------</td>
</tr>
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<td><a href="http://www.reading.ac.uk/uk/virtualexperiments/vesicle.html">http://www.reading.ac.uk/uk/virtualexperiments/vesicle.html</a></td>
<td>Part 1: Dissecting an albatross bolus: Man's impact on ocean life</td>
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<td><a href="http://www.reading.ac.uk/uk/virtualexperiments/vesicle.html">http://www.reading.ac.uk/uk/virtualexperiments/vesicle.html</a></td>
<td>Part 2: Dissecting actual albatross bolus</td>
</tr>
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</table>

**Plankton**

- Watch video on plankton

**Going further: Play Virtual Food Web Game**

- Do: Read: Background information on plankton
- Do: Look at living or preserved plankton under microscope
- Do: Activity 2: Engineering challenge: Create a phyto and a zooplankton

**Virtual lab on elodea plant and photosynthesis/vesicle**

- Do: Read: Activity 1: Match your plankton
- Do: Activity 2: Engineering challenge: Create a phyto and a zooplankton

**Part 1: Dissecting an albatross bolus: Man's impact on ocean life**

- Do: Dissect an albatross bolus
- Do: Show: PowerPoint on albatross
- Do: Virtual dissection of albatross bolus

**Part 2: Dissecting actual albatross bolus**

- Do: Share data
- Do: Create: Informational backboard on albatross

**Hurricanes and hurricane preparedness**

- Hurricane proof house: paper plate
- Handout: Are you ready index cards (large)
- Computers: Online games
- Handout: Are you ready index cards (large)
- Computer: Online images of damage caused by hurricanes and ask students to share own personal experiences
- http://www.novices.com/interactive/2012/11/14/

**Supplies**

- Copies of plankton pictures
- Clay
- Straws
- Pipe cleaners
- Toothpicks
- Packing peanuts
- Thumbtacks
- Paper clips
- Microscopes
- Preserved/living plankton
- Albatross bolus bags
- Ziploc bags
- Probes
- Scissors
- Magnifying glass
- Poster paper

**Resources**

| 10 | Why the oceans important to man | **Hook:** Ask students all of the reasons why oceans are beneficial to man.  
**Do as whole class**  
http://www.nature.org/ourinitiatives/habitats/oceans/coasts/explore/five-reasons-we-are-all-connected-to-oceans.xml  
**Do:** Have students create an informational posters/powerpoint/imovie on why the oceans are important to man. Make this into a competition for the best presentation. Can be displayed or presented at engineering challenge weekend. | - Computer  
- internet access  
- Poster paper  
- Colored markers |
<table>
<thead>
<tr>
<th>Squid Dissection</th>
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</thead>
<tbody>
<tr>
<td><strong>Watch:</strong> Ted talk &quot;How we found the giant squid&quot; <a href="https://www.ted.com/talks/edith_widder_how_we_found_the_giant_squid?language=en">link</a></td>
</tr>
<tr>
<td><strong>Do:</strong> Squid Dissection</td>
</tr>
<tr>
<td>- tweezers</td>
</tr>
<tr>
<td>- scissors</td>
</tr>
<tr>
<td>- probe/toothpick</td>
</tr>
<tr>
<td>- paper towels</td>
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<tr>
<td>- newspaper</td>
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