The HMS SeaBots
SeaPerch Team Requirements:
Phases 1, 2 & 3

The HMS SeaBots Team members must work extremely hard all year to prepare for the NJ SeaPerch Competition held in the spring at Rowan University in Glassboro. At the NJ SeaPerch competition, there are two categories for middle school teams: ‘Middle School’ and ‘Open’. The Middle School category competition requirements include: two pool missions (an obstacle course and a mission unveiled in December), a 20-page notebook, a display board, and an oral presentation. The Open category teams are only required to do the pool missions. The notebook and display board are optional. The winner of the Middle School category advances to the National SeaPerch Competition.

Last year with over 40 SeaPerch team members, we divided our team into six teams. Two teams represented HMS in the Middle School category and four teams in the Open category. We were very fortunate to have all six teams compete at the NJ competition. That may not be the case each year. It depends on how many schools register for the NJ competition. The maximum number of teams from HMS this year may only be two: one Middle School team and one Open team. However, it could be up to six teams. We will not know how many HMS teams we can enter until January. Our goal until that time is to determine which individual students will best represent our school in the Middle School category at the NJ SeaPerch Competition. The other students will make up the teams for the Open category.

Students interested in joining the HMS SeaBots SeaPerch Team will select a team position: Mechanical Engineer, Electrical Engineer, Navy Ocean Engineer or Marketing Representative. The caliber of work completed be each member in the first two phases, work ethic, and dedication to the HMS SeaBots Team will determine the formation of the teams. The number of students per team will depend on the number of students on the SeaPerch team. The top Middle School team will probably have one or two students from each of the posted positions. Students do not pick their own teams.

Still interested in joining? If so, apply for a position on the HMS SeaBots SeaPerch Team! Write a letter to the coach answering the following questions:

1. Which position you want to apply for and why that position?
2. What qualities will you bring to the team?
# The HMS SeaBots

## SeaPerch Team Requirements: Phases 1, 2, & 3

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<tr>
<th>PHASE 1:</th>
<th>Mechanical Engineers</th>
<th>Electrical Engineers</th>
<th>Navy Ocean Engineers</th>
<th>Marketing Representatives</th>
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</table>
| All work in Phase 1 will be done independently. This work is to be completed by mid-November. | Mech Es are responsible for the ROV’s structure/frame, ballast, propulsion/placement of thrusters, and the payload (in Phase 3). Your goal is to design and build the fastest ROV possible to prepare for the SeaPerch obstacle course! **REQUIREMENTS:**  
  • Complete a daily journal  
  • Complete homework assignments  
  • Keep a detailed SeaPerch notebook  
  • Master topics such as: types of buoyancy, center of buoyancy, center of gravity, torque, stability, drag, thruster placement, weight, etc. in relation to ROVs  
  • Research design strategies and document findings  
  • Create detailed ROV design sketches (computer-generated preferred)  
  • Use your sketches to build prototypes  
  • Understand buoyancy and ballast and be able to calculate the mass of ballast required for neutral buoyancy  
  • Be able to provide the Marketing Representatives with detailed notes and sketches  
  • Prepare to orally present your findings to a panel of judges. Be able to justify your design and how it was created with speed in mind. | EEs are responsible for the ROV’s electrical components: the control box, tether, power cord, and battery. Your goal is to solder the control box, wire the components, and be able to repair any electrical malfunction! **REQUIREMENTS:**  
  • Complete a daily journal  
  • Complete homework assignments  
  • Keep a detailed SeaPerch notebook  
  • Master topics such as: direct current, circuits, how switches work, motors, printed circuit boards (PCB), voltage, amperage, soldering, etc.  
  • Learn how to use a multimeter for testing electronics  
  • Practice soldering and waterproofing techniques  
  • Create SID (system integration diagram) showing the SeaPerch ROV circuit (computer-generated if possible)  
  • Be able to provide the Marketing Representatives with detailed notes and SID  
  • Prepare to orally present your findings to a panel of judges. Be able to explain all the components involved in the ROV circuit and how they all work. | Naval Ocean Engineers are responsible for understanding the challenges of working in water (physical properties of water) and knowing exactly how the US Navy uses ROVs. Your goal is to become an expert on working in water and where, when, and why the Navy uses ROVs to complete missions around the world! **REQUIREMENTS:**  
  • Complete a daily journal  
  • Complete homework assignments  
  • Keep a detailed SeaPerch notebook  
  • Research how ROVs are used by the Navy  
  • Research how others are using ROVs  
  • Research other ocean technology used by the Navy  
  • Interview someone in the Navy in reference to ROVs (PLEASE get permission from the coach prior to reaching out to Naval personnel!)  
  • Be able to provide the Marketing Representatives with detailed information about the Navy’s use of ROVs  
  • Prepare to orally present your findings to a panel of judges. Be able to justify the Navy’s need for ocean technology. | Marketing Reps are responsible for creating the team’s display board, organizing the team’s notebook, and creating other marketing tools for the team (examples: brochure, business cards, social media, etc.). We need skillful writers, editors, and creative minds! **REQUIREMENTS:**  
  • Complete a daily journal  
  • Complete homework assignments  
  • Keep a detailed SeaPerch notebook  
  • Research competition requirements for the poster, the 20-page notebook, and the oral presentation (rubrics will be provided)  
  • Communicate effectively with the engineers to obtain work for your board and notebook  
  • Prepare to orally present your findings to a panel of judges with examples of your work that highlight your creative ideas and prove you understand the rubrics that will be used. |

*Note: The above table outlines the responsibilities and requirements for each team member in Phases 1, 2, and 3 of the SeaPerch project. Each team member is assigned specific tasks and must complete them independently, with the goal of preparing for the SeaPerch obstacle course and demonstrating their findings to judges.*
**PHASE 2:**
All work in Phase 2 will be done with a partner or partners, but your work will be evaluated independently. This work is to be completed by mid-December. Students interested in piloting will apply during this phase.

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<thead>
<tr>
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<tr>
<td>• Written test of your MechE knowledge</td>
<td>• Written test of your EE knowledge</td>
<td>• Written test of your Navy Ocean Engineering knowledge</td>
<td>• Written test of your Marketing skills.</td>
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<td>• Complete the buoyancy and ballast calculations to determine the ballast needed to achieve neutral buoyancy</td>
<td>• Solder the control box components to the PCB</td>
<td>• Orally present your findings to a panel of judges. Be able to explain the Navy’s need for ROVs and other ocean technologies.</td>
<td>• Orally present your ideas to a panel of judges. Share an example of your creativity and ideas for the team. Also demonstrate for understanding of the SeaPerch rubrics.</td>
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<td>• Time trials! Test your ROV designs in the pool. You will collect data on each ROV you test. You should test a minimum of three designs. Graph your data. Remember, your goal is to build the fastest ROV!</td>
<td>• Waterproof the motors and solder the motors to the tether</td>
<td>• Orally present your findings to a panel of judges. Discuss your troubleshooting strategies and how you are prepared to fix the team’s ROV if it malfunctions.</td>
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<tr>
<td>• Orally present your findings to a panel of judges. Justify your design and how it is created for speed.</td>
<td>• Troubleshooting scenarios! You will be presented with broken ROVs. You will need to troubleshoot the problem and fix the ROVs.</td>
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**PHASE 3:**
Teams will be formed based on work in Phases 1 & 2 and based on the number of teams we are permitted to enter. This work will go from January through May.

**NJ SeaPerch will determine the exact number of teams we will be permitted to enter.**

2014-15 (Six HMS teams competed):
HMS SeaBots Middle School Team
HMS SeaBots Middle School Team
HMS SeaBots Open Team
HMS SeaBots Open Team
HMS SeaBots Open Team
HMS SeaBots Open Team

The individual teams will learn to work together and share each other’s work from phases 1 & 2. By this time, the second mission will be unveiled, and all the teams must modify their ROVs to complete the second mission - without compromising speed! The two ‘Middle School Teams’ will continue to meet every Tuesday until 4:10. Both of these teams will organize their notebooks and create a display board. Since the students on the ‘Open’ teams do not have to complete a notebook or display board for the competition, they may be excused from some of the SeaPerch meetings or may only have to attend the meetings until 3:10. By mid-February, we should be ready for official practices at the YMCA. All of the teams will practice at the YMCA to prepare for the competition. Please keep in mind that if the NJ SeaPerch Competition is held after Harrington’s spring break, we will practice at the Jersey Wahoos Swim Club in the morning for a few days during our spring break. The SeaPerch notebook is due approximately 2-3 weeks prior to competition.
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<td><strong>SeaPerch Training Videos:</strong></td>
<td>* <a href="http://www.seaperch.org/online_training_videos">www.seaperch.org/online_training_videos</a></td>
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<tr>
<td>• SeaPerch Basics</td>
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<td>• Unit 1: Assembly of the Vehicle Frame</td>
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<td>• Unit 2: Motors, Control Box and Testing</td>
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<td><strong>SeaPerch Construction Manual</strong></td>
<td>* <a href="http://www.seaperch.org/online_training_videos">www.seaperch.org/online_training_videos</a> (PDF file on page)</td>
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<td><strong>MIT SeaPerch</strong></td>
<td>* seaperch.mit.edu/build_videos.php</td>
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<td>* seaperch.mit.edu/science.php</td>
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<td>• Science Concepts</td>
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<td><strong>Greater Philadelphia SeaPerch</strong></td>
<td>* <a href="http://www.phillyseaperch.org/module-videos.html">www.phillyseaperch.org/module-videos.html</a></td>
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<td><strong>NJ SeaPerch Rubrics – Poster Presentation &amp; Notebook</strong></td>
<td>* njseaperch.wix.com/2015#!rules--guidelines/cyqp</td>
</tr>
<tr>
<td><strong>MATE – Building the Angelfish Control Box Tutorial Videos</strong></td>
<td>* <a href="http://www.marinetech.org/angelfish-videos/">www.marinetech.org/angelfish-videos/</a></td>
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