STEM Education Based on GPS

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Civil GPS Service Interface Committee
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National Management Structure for GPS

WHITE HOUSE

NATIONAL EXECUTIVE COMMITTEE FOR SPACE-BASED PNT

Executive Steering Group
Co-Chairs: Defense, Transportation

NATIONAL COORDINATION OFFICE

Host: Commerce

ADVISORY BOARD
Sponsor: NASA

Defense
Transportation
State
Interior
Agriculture
Commerce
Homeland Security
Joint Chiefs of Staff
NASA

Civil GPS Service Interface Committee
Chair: Transportation
Deputy Chair: Coast Guard

GPS International Working Group
Chair: State

Engineering Forum
Co-Chairs: Defense, Transportation

Ad Hoc Working Groups
EXCOM Strategic Focus Areas

• GPS Sustainment and Modernization
• International Cooperation
• Spectrum Management
• Critical Infrastructure
• PNT Resilience
• Outreach
• Develop and Retain Space Professionals.
  ...Departments and agencies also shall promote and expand public-private partnerships to foster educational achievement in Science, Technology, Engineering, and Mathematics (STEM) programs, supported by targeted investments in such initiatives.
GPS Outreach & Education

GPS.gov

For Students and Teachers

GPS Educational Resources

Information for Students

What is GPS?
The Global Positioning System is a U.S. owned utility that provides users with positioning, navigation, and timing services.

- Overview
- Space Segment
- Control Segment
- User Segment

Who Uses GPS?
GPS is an essential element of the global information infrastructure. The technology is everywhere from cell phones and consumer electronics to buildings, shopping centers, and ATMs.

- Overview
- Agriculture
- Aviation
- Environment
- Maritime
- Public Safety & Disaster Relief
- Rail

More Questions
- How does GPS work?
- How accurate is GPS?

Resources for Teachers

Next GPS-Based STEM Curriculum
The U.S. government has released a new curriculum that integrates GPS concepts and activities to stimulate student interest in science, technology, engineering, and mathematics (STEM). The curriculum is designed for the middle-high school level and tied to the Next Generation Science Standards (NGSS).

Thanks to all the educators who helped us test the lesson plans in classrooms to see how students respond to the material. Your feedback improved the curriculum prior to its final release.

Classroom Poster
Teachers, order a free copy of the "How GPS Works" poster for your classroom today! Or download and print it yourself.

- Download
- Print

Learn more

GPS Adventures

Time and Navigation
The history of getting from here to there

GPS Outreach and Education
GPS-Based STEM Curriculum

• Uses GPS concepts & applications to stimulate student interest in STEM
• Designed for middle school
• Highlights STEM careers and diversity
• Low/no-cost classroom activities
• Maps to Next Generation Science Standards (NGSS) and Common CORE
• Inquiry based learning using stories, videos, etc.
Inquiry Based Learning – IDEA

**Inquire:** Present an event for inquiry

**Discuss:** Open discussion

**Explain:** Mini lecture

**Apply:** Exercise
# Curriculum Structure

<table>
<thead>
<tr>
<th>Courses</th>
<th>Lessons (3 Per Course)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Earth</strong></td>
<td></td>
</tr>
<tr>
<td>Are we there Yet? Mapping it out with Longitude &amp; Latitude</td>
<td>Do you read me? Radio, Magnets &amp; Information Transfer</td>
</tr>
<tr>
<td><strong>Space</strong></td>
<td></td>
</tr>
<tr>
<td>Launching Explorations Satellites &amp; Orbits</td>
<td>Living Weightless: International Space Station</td>
</tr>
<tr>
<td><strong>Life</strong></td>
<td></td>
</tr>
<tr>
<td>Baby is it Cold Outside? Weather Forecasting</td>
<td>Saving Mother Nature: Environmental Conservation</td>
</tr>
<tr>
<td><strong>Movement</strong></td>
<td></td>
</tr>
<tr>
<td>Up Up &amp; Away! Aviation Moves Us</td>
<td>Networks of Power: Energy &amp; Information</td>
</tr>
</tbody>
</table>
Are We There Yet?!

Get 3 classmates and plan a trip from here to Orlando, FL...you’re going to Disney World!

To plan your trip, what will your team need to determine?

- What are your Longitude and Latitude right now?
- What are the Longitude and Latitude of Orlando, FL?
- How long will you drive before taking a break? Where will that be?
- Using your map and a ruler, calculate the number of miles that you will need to drive to get to Orlando
- Given that $\text{Distance} = \text{Time} \times \text{Speed}$, how long will it take to drive there if you travel an average of 60 miles per hour when driving (remember your breaks!)?

Version 1.0
GEOID & ELLIPSOIDS:
The Earth is an imperfect sphere

- It is Nearly Impossible to measure the surface of the Earth due to the irregularities such as mountains or valleys; and the rise and fall of the ocean tides

- To compensate, scientists use theoretical models: Geoids and Ellipsoids

Let’s do an exercise...
Punching out the globe!

[POtential breakpoint for class session after the exercise]
Sample Materials

GPS/GIS Technology: Training & Careers

In this video adapted from Pathways to Technology, you'll learn how geographic information systems (GIS) and global positioning systems (GPS) are changing the ways professionals, in many fields, make decisions about their businesses. GPS/GIS technology is used...
Check It Out!

GPS.gov/students

GPS-STEM.com (temporary URL)