



**Graduate Seminar (EEL 6936)**  
**Department of Electrical Engineering**  
**[http://ee.eng.usf.edu/Grad\\_Seminar](http://ee.eng.usf.edu/Grad_Seminar)**

**Dr. Douglas Willard, Ph.D.**

Chief, Surface Systems Division  
NASA, Kennedy Space Center, FL, USA  
Friday, March 28<sup>th</sup>, 2014, 3:30-4:30 p.m.  
Engineering Building B (ENB) Room 118

## **NASA Swamp Works—Technology Incubation**

### **Abstract**

The NASA Surface Systems Division, affectionately known as the Swamp Works, is a laboratory located at the Kennedy Space Center that develops new space technologies required for working and living on the surfaces of the Moon, planets, and other bodies in our solar system. Central to how this lab functions is a development philosophy that promotes a hands-on approach. In this lab environment testing is done “early and often”, failures are allowed and these drive designs. This approach aligns closely with that used by Kelly Johnson in Lockheed’s Skunk Works and in Werner von Braun’s Development Shops. The Swamp Works is comprised of the following four laboratories and we will look at what these labs do and how they do it:

- Electrostatics and Surface Physics Laboratory investigates electrostatics and surface physics problems with applications for space flight and planetary exploration.
- Advanced Life Support Laboratory conducts research and technology development activities for human exploration life support and habitation systems.
- Granular Mechanics and Regolith Operations Laboratory works with the regolith (surface materials) on other bodies in space.
- Applied Chemistry Laboratory develops technology for toxic-vapor detection, chemical scrubbers for toxic wastes, in situ resource utilization processes, microencapsulation of materials for space applications, hypergolic-fuel dosimetry, hydrogen detection, self-healing wire insulation, minimally-intrusive repair for electrical wiring, and environmental remediation.

### **Biography**



Douglas Willard, Ph.D. is the Chief of the NASA Surface Systems Division, a.k.a. NASA Swamp Works, at the Kennedy Space Center (KSC). He started with NASA in 1988 working in the areas of mechanism designer and technology/prototype development supporting a wide variety of launch vehicles, X programs, and research and development (R&D) projects. In 2000 he changed career paths and joined the KSC Applied Physics Lab as a physicist focusing on condensed matter theory, electron transport and the Fractional Quantum Hall Effect (FQHE). He has worked as Adjunct Professor at the Florida Institute of Technology since 2003, teaching Solids Modeling and Principles of 3D Mechanical Design. He has a Bachelors degree in Mechanical Engineering from University of South Florida, as well as Masters and Ph.D. degrees in Physics from the University of Central Florida.