

## **Description of SURF Gaithersburg Research Preferences**

### **SURFING CNST – The Center for Nanoscale Science and Technology**

Projects support nanotechnology from discovery to production by providing industry, academia, NIST, and other government agencies with access to world-class nanoscale measurement and fabrication methods and technology. Primary focus areas are: future electronics; nanofabrication and nanomanufacturing; and energy storage, transport, and conversion

**Range of Research Activities:** nanofabrication, atomic-scale characterization & manipulation, nanophotonics, nanomagnetism, nanoplasmonics, environmental TEM, nanoelectromechanical systems, thermoelectrics & photovoltaics, theory of nanostructures, and nanoscale control; [additional information...](#)

**Relevant Academic Majors:** physical sciences, engineering, materials science, physics, chemistry, biochemistry, mathematics, computer science

**Selection Rate\* (summer 2016):** 47 applicants, 6 fellowships awarded (13%)

### **SURFING EL – Engineering Laboratory**

Projects promote the development and dissemination of advanced manufacturing and construction technologies, guidelines, and services to the U.S. manufacturing and construction industries

**Range of Research Activities:** innovative fire protection, sustainable manufacturing; model-based engineering enterprise; intelligent manufacturing (automation, robotics, and equipment); additive manufacturing; net zero energy buildings; integrated and automated construction processes; building materials and systems; economic impacts; and disaster-resilient structures and communities; [additional information...](#)

**Relevant Academic Majors:** engineering including fire science, materials science, physics, chemistry, mathematics, statistics, computer science, and economics (electrical engineers should apply to PML)

**Selection Rate\* (summer 2016):** 115 applicants, 33 fellowships awarded (29%)

### **SURFING ITL/CTL – Information Technology Laboratory/Communication Technology Laboratory**

Projects provide hands-on experience in computational science, applied mathematics, statistics, software testing, computer security, information access and networking.

**Range of Research Activities:** human computer interaction, computer network modeling, pervasive computing, multimedia computing, information security, biometrics for computer access and security, cryptography, computer forensics, statistics, software measurement science, software quality testing, digital data retrieval and preservation, bioinformatics, mathematical modeling, and image analysis; [additional information...](#)

**Relevant Academic Majors:** computer science, mathematics, statistics

**Selection Rate\* (summer 2016):** 102 applicants, 39 fellowships awarded (38%)

## **SURFING MML/NCNR – Material Measurement Laboratory/NIST Center for Neutron Research**

*Applicants can choose from two SURF concentrations:*

**Materials Science** – Projects focus on synthesis, measurements, and computational/theory/modeling of innovative materials and devices

**Range of Research Activities:** ceramics, metallurgy, polymers, condensed matter science, biomaterials, semiconductors, metals, nanoscale materials and measurements (includes activities at the NCNR)

**Relevant Academic Majors:** materials science, chemistry, biochemistry, physics, physical sciences, mathematics, computer science, engineering, biological sciences, nuclear engineering (limited slots)

**Selection Rate\* (summer 2016):** 118 applicants, 51 fellowships awarded (43%)

**Chemical and Biochemical Sciences** – Projects address the nation’s needs for measurements, standards, technology development, and reference data in the areas broadly encompassed by chemistry, biotechnology, and chemical engineering.

**Range of Research Activities:** from fundamental work in the composition, structure, properties, and processes of chemical, biological, environmental, and nanomaterials to the development and dissemination of certified reference materials, critically evaluated data, and advanced chemical and biochemical measurement paradigms

**Relevant Academic Majors:** chemistry, biochemistry, molecular biology, chemical engineering, computer science, environmental science, and to a lesser extent materials science, physics, mathematics, and other areas of engineering

**Selection Rate\* (summer 2016):** 110 applicants, 22 fellowships awarded (20%)

[additional information...](#)

## **SURFING PML – Physical Measurement Laboratory**

*Applicants can choose from two SURF concentrations:*

**Physics** - Projects provide hands-on research experience in physics fields of atomic, molecular, optical, radiation, chemical, and condensed matter physics.

**Range of Research Activities:** atomic and molecular effects in spectroscopy, surface effects, collision dynamics, and chemistry; radioactivity in environmental sensing, industrial dosimetry, and physical therapy; laser cooling and trapping; UV/optical/infrared light in detector development, tweezers, and quantum optics; QED effects on atomic structure.

**Relevant Academic Majors:** physics, computer science, electrical engineering, mechanical engineering, mathematics, nanoscience

**Selection Rate\* (summer 2016):** 70 applicants, 18 fellowships awarded (23%)

**Electrical Engineering** - Projects involve developing new electronic devices and metrology to serve US industry’s need for improved and standardized measurements.

**Range of Research Activities:** Electrical engineering and control of systems applications for power-efficient electronics, reliability, high power and smart grid, CMOS and nanoelectronics, dimensional metrology, and nano-interconnects. Also cross-disciplinary electronics applications such as large area electronics (including

solar cells), molecular/organic electronics, bioelectronics, MEMS, and quantum-based devices related to electrical and mass standards.

**Relevant Academic Majors:** biochemistry, chemistry, computer science, electrical engineering, mechanical engineering, material science, mathematics, nanoscience, and physics.

**Selection Rate\* (summer 2016):** 30 applicants, 18 fellowships awarded (60%)

**[additional information...](#)**

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*\*The historical acceptance rate for the SURF Gaithersburg program is approximately 33% (i.e., for every three student applicants, one student gets accepted). The number of student applicants each year will impact these statistics. Each Laboratory lists the acceptance rate for the students that applied to that laboratory as their 1<sup>st</sup> choice. Students may be considered by other Laboratories for projects, thus giving students more opportunities to receive an internship.*