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Research and Sponsored Programs Office (RSPO) Sponsored Research Annual Reports

2006

Sponsored Programs Annual Report / Graduate School of Engineering and Applied Sciences, Fiscal Year 2006.

Monterey, California. Naval Postgraduate School, Research and Sponsored Programs Office

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SPONSORED PROGRAMS ANNUAL REPORT

GRADUATE SCHOOL OF ENGINEERING AND APPLIED SCIENCES

NAVAL POSTGRADUATE SCHOOL • FISCAL YEAR 2006

Program Information

The Graduate School of Engineering and Applied Sciences (GSEAS) at the Naval Postgraduate School in Monterey, California provides graduate education leading to the master of science, engineer, doctor of philosophy, and doctor of engineering degrees.

GSEAS is composed of seven technical academic departments (applied mathematics, electrical and computer engineering, mechanical and astronautical engineering, meteorology, physics, oceanography, systems engineering) and one interdisciplinary academic group (space systems). These entities offer degree programs tailored to the specific needs of the Navy and defense community at large, at the same time providing the technical foundation for student theses and interdisciplinary projects of faculty and students. Research centers and unique laboratory facilities (e.g., the spacecraft research and design lab, rockets and combustion lab, signal enhancement lab, ocean acoustics observatory, interactive digital environment analysis lab, secure space-systems research lab, secure computer-network research lab, and directed energy lab) add rigor to the resident academic and sponsored programs.

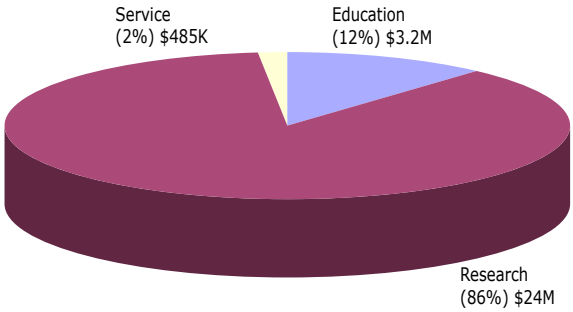
GSEAS' defense-related research aggressively develops and incorporates advances in learning and technology, ensuring that our faculty, instruction, and students remain at the crest of their disciplines. Instruction is "real world:" our students handle the latest defense technologies and nascent systems on a routine basis, including electric-powered ships; nanotechnologies; directed-energy weapons; electric rail guns; the electrical and computer-engineering systems underlying concepts such as net-centric warfare; unmanned underwater, aerial, and land systems; space systems; battlespace environments and their impact on combat; and many others.

Conceptual mastery is paramount in our teaching philosophy. GSEAS students not only learn why things work, but why they don't, as well as how scientific and engineering principles can be applied to the integration of the U.S. military with various defense systems (such as sonar, radar technologies, and others) to enable future war-fighting concepts and capabilities. GSEAS is truly a joint school, with healthy enrollments of all military services. No other graduate school can compete with the combination of rigorous education and joint-military orientation found at the Naval Postgraduate School.

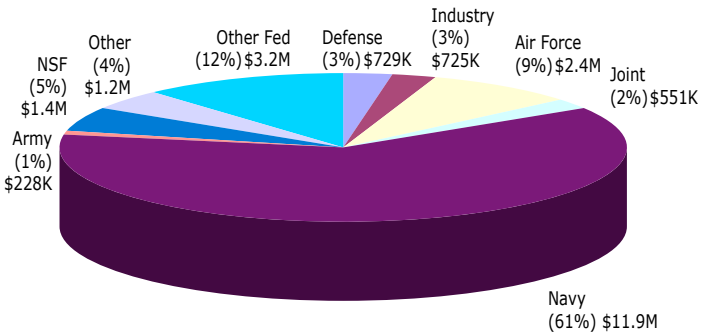
Sponsored Program Expenditures

1 October 2005–30 September 2006
Total Expenditures: $27,437K

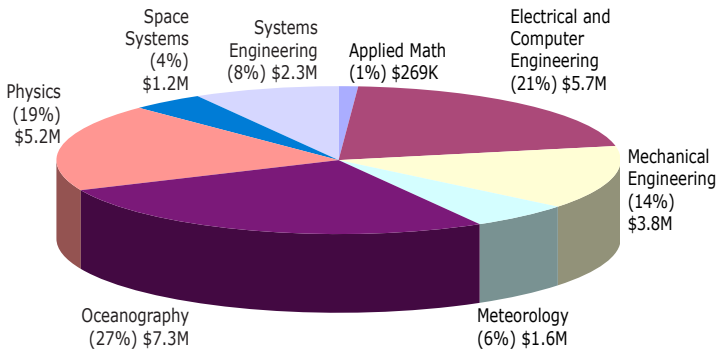
By Type of Activity



By Sponsor



By Department



Leonard Ferrari, Acting President and Provost
Dan Boger, interim Dean of Research
Danielle Kuska, Director, Research and Sponsored Programs Office

Published by the Research and Sponsored Programs Office
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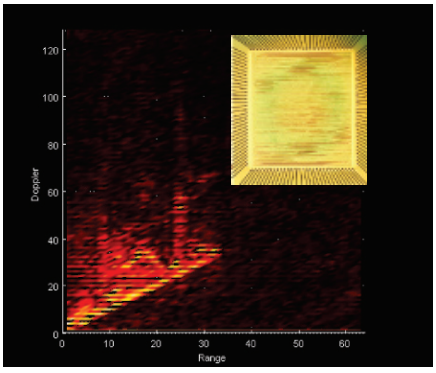
Applied Mathematics (MA)

The Department of Applied Mathematics provides exceptional education supporting relevant and strategic research for our sponsors. Our curriculum emphasizes modern mathematical techniques and the cultivation of analysis, reasoning, and creativity. We serve our clients, students, and profession not only through research and education, but by leadership in professional organizations and scholarly contributions to the body of mathematical knowledge. The department employs eighteen regular faculty and offers both the M.S. and PhD.

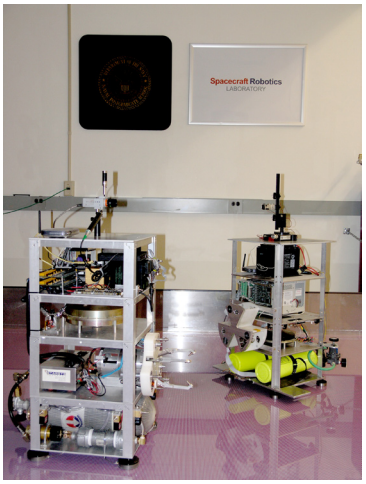
Electrical and Computer Engineering (ECE)

The Electrical and Computer Engineering Department is the major contributor to officer education in the electronic- systems engineering curriculum and provides service courses for a variety of other programs, including space systems, information warfare, electronic warfare, information systems, and undersea warfare. The department offers programs leading to the electrical-engineer degree (EE), doctor of philosophy, and master of science (MSEE and MSES), typically awarding 40+ master's degrees and several EEs and Ph.D.s annually. The core curriculum spans the breadth of electrical and computer engineering. Students concentrate in a major through advanced courses. Major areas of study support Sea Power 21 and include sensor systems, network engineering, communications and digital signal processing, nanoelectronics and computers and electric power and control. The department employs thirty-seven tenure-track, non-tenure track, and active emeritus faculty.



NPS-developed inverse-synthetic-aperture radar electronic-countermeasures chip superimposed on false target of ship it created.

Mechanical and Astronautical Engineering (MAE)



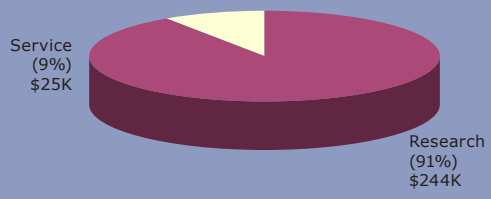
Autonomous docking and servicing test bed, Spacecraft-Robotics Lab

The Mechanical and Astronautical Engineering Department supports a wide variety of fundamental and applied research. Masters and doctoral students are integrally involved in research projects, working alongside faculty, postdoctoral fellows, and research staff to solve complex technical problems relevant to national security.

Academics cover thermal-fluid sciences and propulsion, structural mechanics, autonomous-vehicle control and navigation, materials science and total-ship systems engineering, and satellite and spacecraft design and engineering. MAE supports development and operation of submarines, surface combatants, aircraft, autonomous vehicles, and missile and satellite systems and conducts theoretical, computational, modeling and simulation, and experimental research, both classified and unclassified.

Applied Mathematics

By Activity



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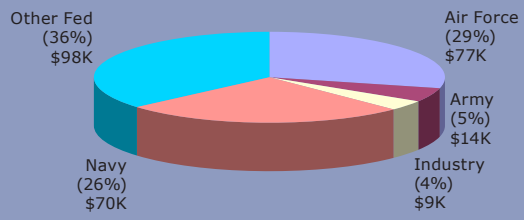
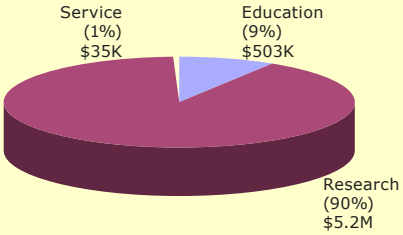


Size of Program: $269K

Electrical and Computer Engineering

By Activity



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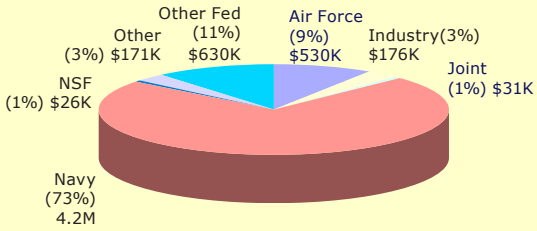
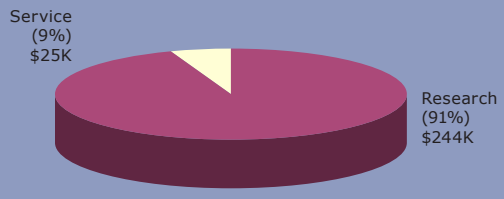


Size of Program: $5.7M

Mechanical and Astronautical Engineering

By Activity



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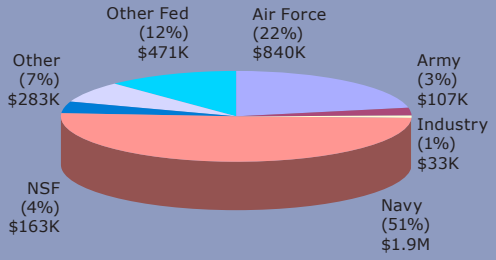
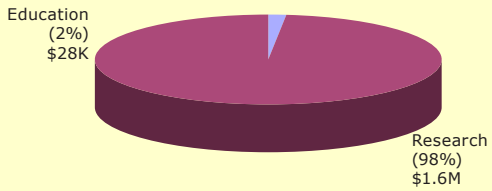


Size of Program: $3.8M

Meteorology

By Activity



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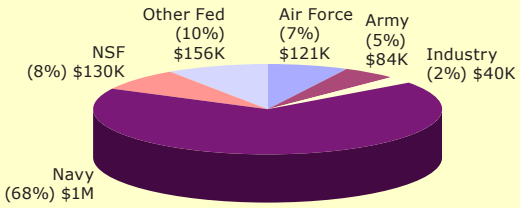
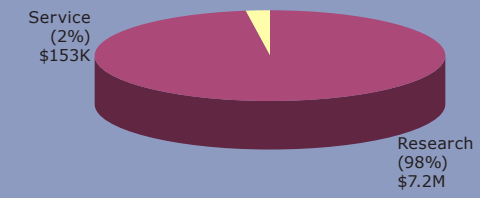


Size of Program: $1.6M

Oceanography

By Activity



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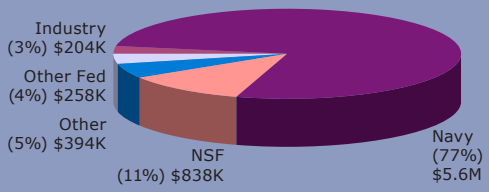
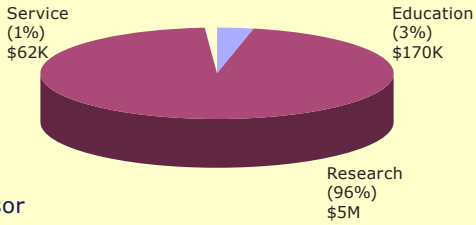


Size of Program: $7.3M

Physics

By Activity



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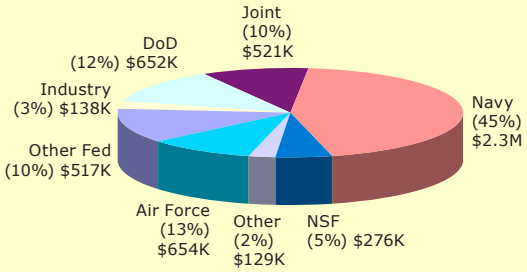
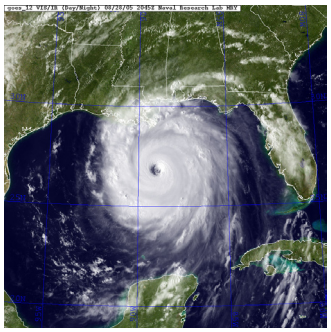


Size of Program: $5.2M

Meteorology (MR)



Hurricane Katrina. Credit: Naval Research Lab, NPS

Since inception in 1946, NPS's Department of Meteorology has conducted one of the premier programs in the United States and the world, featuring multimillion-dollar facilities and instruction by expert faculty. The department offers M.S. and Ph.D. degrees to U.S. military officers, government civilians, and officers from allied countries. The curricula provide a thorough grounding in meteorological science and instill the expertise required for working with meteorological data and models in all aspects of weather-dependent operations.

Concentrations include synoptic, mesoscale, and coastal meteorology; numerical weather prediction; environmental analysis and visualization; air–sea interactions; satellite- and ground-based remote sensing; tropical meteorology; tropical cyclones; boundary-layer meteorology; climate dynamics; and atmospheric factors in electromagnetic/electro-optical propagation. Military operations and research are emphasized across the board and enhanced by collaboration with the Fleet Numerical Meteorological and Oceanographic Center and Naval Research Laboratory.

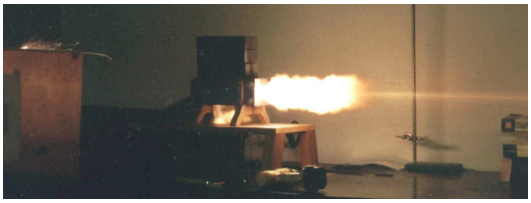
NPS-designed arctic autonomous ocean-turbulence buoy beams data to NPS, thence to internet

Oceanography (OC)

The Oceanography Department supports curricula sponsored by the Oceanographer of the Navy: oceanography, air-ocean science, and operational oceanography. The department also offers the MS in physical oceanography to undersea-warfare curricula (USN and international) and provides core courses for undersea warfare and the space-systems curricula.

The OC department focuses primarily on physical oceanography, acoustical oceanography, numerical modeling, and nearshore and coastal oceanography, and has strong interests in remote sensing and geospatial information systems. Topics include ocean dynamics, numerical ocean prediction and simulation, satellite remote sensing of the ocean, air-sea interaction, polar oceanography, upper ocean dynamics and thermodynamics, near-shore processes, mesoscale dynamics, coastal ocean circulation and environmental acoustics.

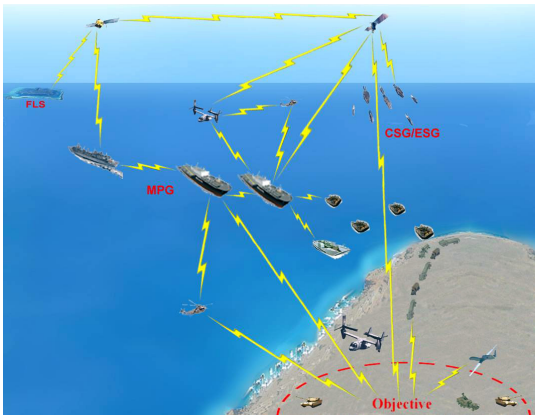
Physics (PH)



Electromagnetic rail gun under development at NPS

The Department of Physics conducts basic and applied research in acoustics, optics, opto-electronics, directed-energy weapons (rail guns and free-electron lasers), sonar and radar, shaped-charge explosives, advanced semiconductor sensors, and remote sensing. The department offers the master's and PhD degrees in physics, applied physics, and engineering acoustics. Our graduates fill a spectrum of assignments in the development of future combat systems, working creatively and practically in conceiving, developing, and acquiring advanced combat systems.

Systems Engineering (SE)



An operational view of a recent system of systems design for expeditionary warfare

Systems engineering is the discipline responsible for creating and executing an interdisciplinary process to ensure that the customer and stakeholder's needs are satisfied in a high quality, trustworthy, cost-efficient and schedule-compliant manner throughout a system's entire life cycle. The SE department prepares graduates for national-security challenges by equipping them to design, analyze, build, operate, maintain, and improve defense systems-of-systems that are reliable, capable, effective, and affordable. The department has fifteen faculty members with primary appointments, ten with joint appointments, and two administrative staff. We currently offer master's degrees and will soon offer the PhD in systems engineering; students number about 60 resident and 150 non-resident. The department works closely with NPS's Wayne E. Meyer Institute of Systems Engineering, especially in research.

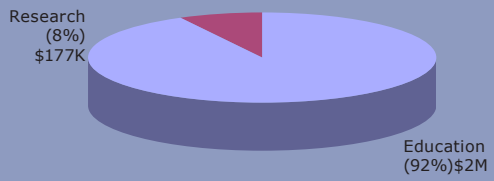
Space Systems Academic Group (SP)


NPSAT1 demonstration satellite engineering-development unit under vibration testing, Naval Research Lab, 9/2005.

Preparing students to lead DoD transformation and exploit technological change is the space-systems academic group's reason for being. Our graduates emerge as pioneers, innovators, and determined problem solvers in science and engineering. Special facilities of the group include an electron linear accelerator; flash X-ray facility; FLTSATCOM satellite operations; NPS-AFRL optical-relay spacecraft laboratory; open-site EMI/EMC facility; radiation-effects laboratory; satellite ground station; simulation- and test laboratory; small-satellite test- and development laboratory; smart-structures laboratory; solar-simulation facility; space-warfare computer laboratory; spacecraft-attitude dynamics-and-control laboratory; spacecraft environmental simulation- and test laboratory; spacecraft-servicing and robotics laboratory; and a sensitive-compartmented-information facility for classified research and thesis work. A number of theses have been written on the second, soon-to-be-launched NPS satellite, NPSAT1; the first student-built satellite, 1998's PANSAT, generated over 50 theses.

Systems Engineering

By Activity



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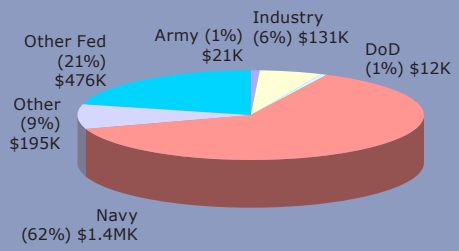
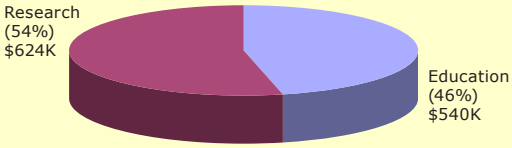


Size of Program: $2.2M

Space Systems Academic Group

By Activity



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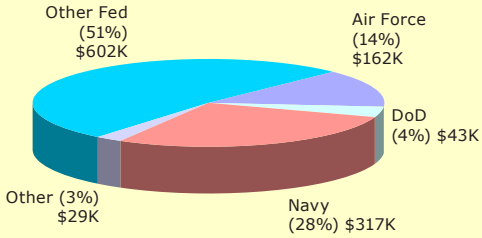

Size of Program: $1.2M

Graduate School of Engineering and Applied Sciences

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