



NAVAL POSTGRADUATE SCHOOL

MEASURES

MISSION

AY 2020



MISSION

Provide defense-focused graduate education, including classified studies and interdisciplinary research, to advance the operational effectiveness, technological leadership and warfighting advantage of the Naval service.



QUICK FACTS ACADEMIC YEAR 2020

2020 ACADEMIC PROGRAMS ANNUAL FACTBOOK



LEADERSHIP

President: Vice Admiral Ann E. Rondeau, USN (Ret)
Provost: Dr. Steven R. Lerman/ Dr. Robert Dell (Acting Provost)
Chief of Staff: CAPT Philip Old, USN
Dean of Students: CAPT Markus J. Gudmundsson, USN
Dean of GSDM: Dr. Keith Snider
Dean of GSEAS: Dr. Clyde Scandrett
Dean of GSOIS: Dr. Robert Dell/Dr. Daniel Boger (Acting Dean)
Dean of IDS: Dr. James Wirtz
Dean of Research: Dr. Jeffrey Paduan
Vice Provost: Dr. Douglas Moses



FACULTY & STAFF

230 Tenure Track Faculty
Non-Tenure Track Faculty:
162 Instructional Faculty
178 Research Faculty
18 Administrative Faculty
328 Staff



SPONSORED | REIMBURSABLE

- Approx **\$101 million** in sponsored/reimbursable funding expended
- Research programs are aligned to NPS curricula
- NPS research is valuable to improving the security of the U.S.



STUDENT ENGAGEMENT

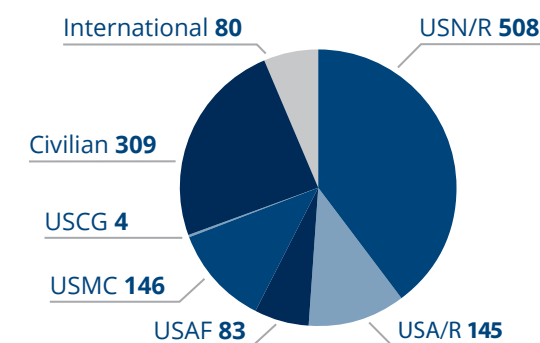
1,480 RESIDENT DEGREE
866 DISTANCE LEARNING DEGREE
425 CERTIFICATE/NON-DEGREE
13,295 EE/PD*
16,066 total engagement



DEGREES AWARDED

1,259 Masters Degrees
16 Doctorate
1,275

NPS GRADUATE DEGREES CONFERRED BY SERVICE



* EE/PD = Executive Education/Professional Development



FINANCIALS

- **\$105** million Direct Authorization: without military salary
- **\$90** million Reimbursable Income



ACADEMIC FACILITIES

62 Classrooms that offer media technology
8 Classrooms with Video-Conferencing
4 FLEX Classrooms of the Future
4 Auditoria
48 Labs



ACCREDITATION

- WASC Senior College and University Commission (WSCUC)
- Accreditation Board for Engineering and Technology (ABET)
- Association to Advance Collegiate Schools of Business (AACSB)
- Network of Schools of Public Policy, Affairs, and Administration (NASPAA)

Source: Office of Institutional Research

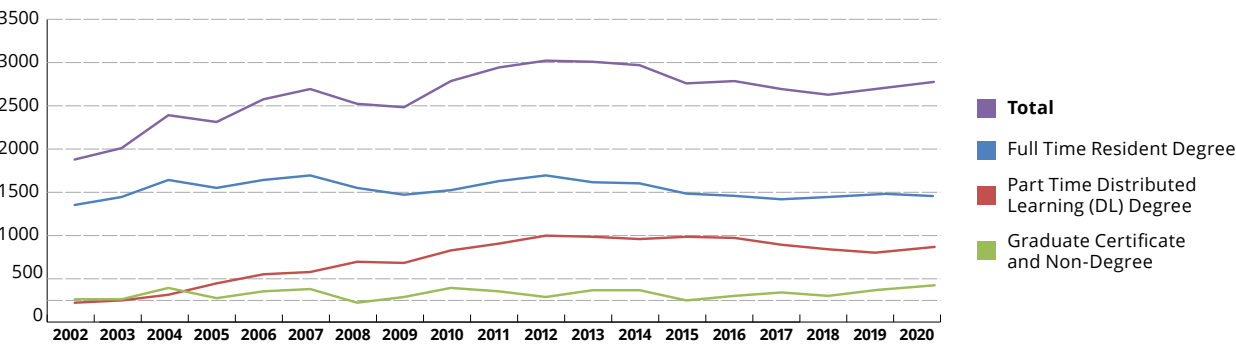
INSTITUTIONAL RESEARCH

NAVAL POSTGRADUATE SCHOOL
 IR@nps.edu | University Circle, Monterey, CA 93943

NPS STUDENTS AND PROGRAMS

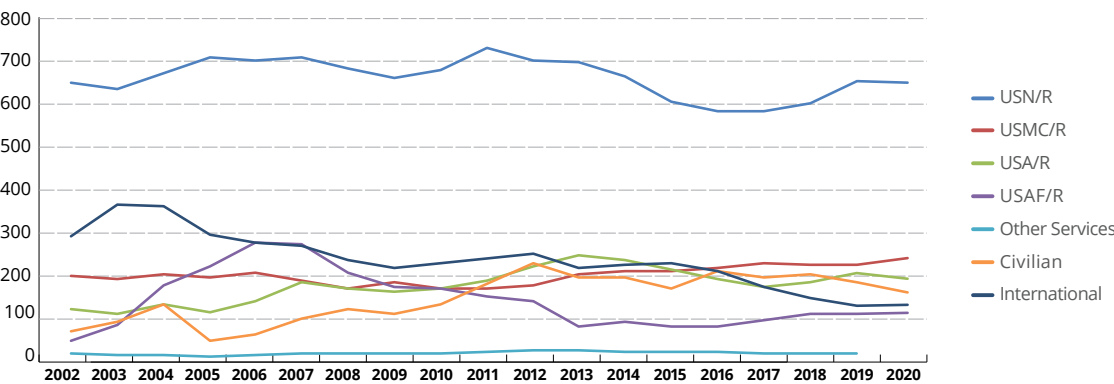
GRADUATE PROGRAM STUDENTS

By Type of Enrollment



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Full Time Resident Degree	1,366	1,464	1,660	1,563	1,649	1,707	1,565	1,487	1,536	1,647	1,712	1,633	1,616	1,494	1,479	1,432	1,459	1,497	1,480
Part Time Distributed Learning (DL) Degree	238	264	336	467	566	599	718	705	839	920	1013	1000	977	997	989	909	853	820	866
Graduate Certificate and Non-Degree	287	289	410	293	368	398	249	304	414	377	307	385	385	276	326	356	327	387	425
Total	1,891	2,017	2,405	2,324	2,584	2,704	2,531	2,496	2,789	2,944	3,031	3,018	2,979	2,767	2,794	2,697	2,639	2,704	2,771

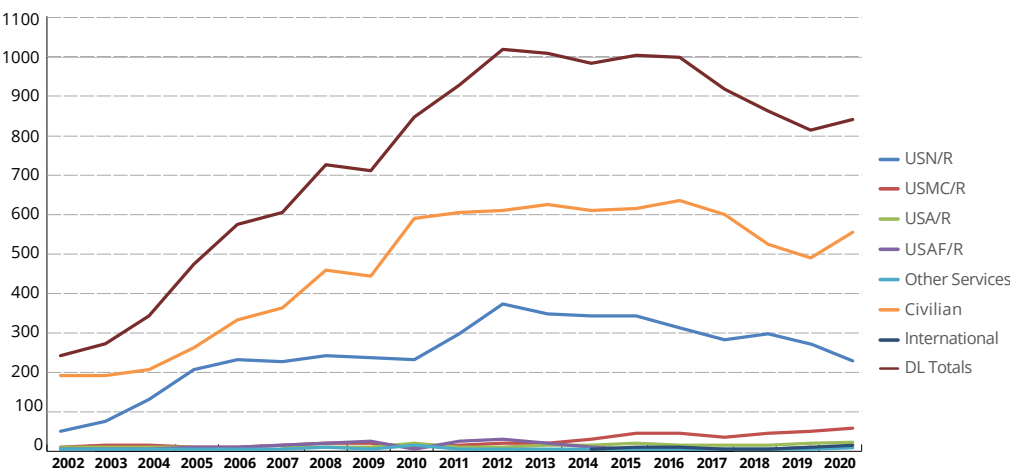
Resident Degree Students by Service



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
USN/R	648	636	671	709	702	708	685	660	681	731	700	698	666	606	581	582	600	655	649
USMC/R	195	186	198	192	201	183	163	178	164	165	173	199	207	205	213	223	222	221	244
USA/R	115	106	126	110	134	179	163	157	165	182	216	242	231	207	187	169	179	201	189
USAF/R	43	80	172	217	274	269	201	167	166	145	133	74	86	74	73	88	105	106	108
Other Services	13	9	7	5	9	11	10	10	10	15	19	19	15	14	14	11	10	10	9
Civilian	63	86	126	41	56	92	114	103	127	174	223	192	191	166	204	192	199	181	155
Int'l	289	361	360	290	274	266	230	213	224	235	248	211	222	222	207	167	144	123	125
Total	1,366	1,464	1,660	1,563	1,649	1,707	1,565	1,487	1,536	1,647	1,712	1,633	1,616	1,494	1,479	1,432	1,459	1,497	1,480

Numbers may not sum to total due to rounding.

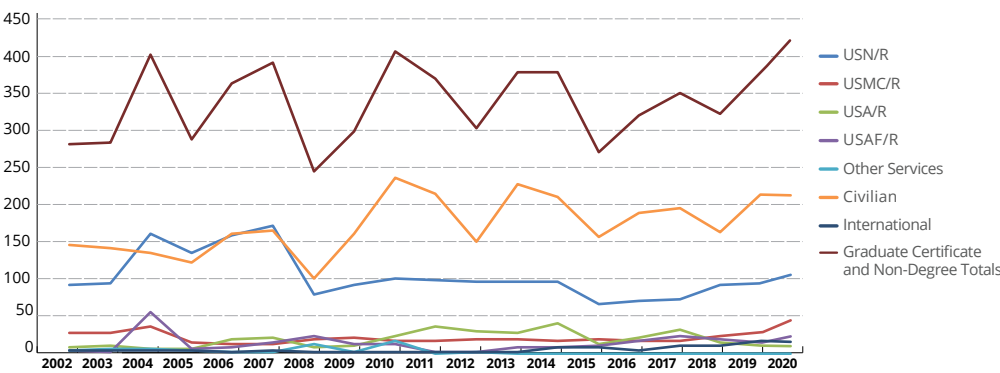
Distance Learning Degree Students by Service



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
USN/R	44	68	124	199	226	220	234	232	226	291	366	343	335	335	306	277	291	277	256
USMC/R	3	7	7	6	7	11	12	13	4	9	16	17	26	39	39	31	37	43	53
USA/R	4	5	3	2	0	2	4	3	17	4	5	7	8	12	11	8	8	13	14
USAF/R	0	0	0	3	5	10	15	18	0	20	22	14	6	1	1	1	0	2	2
Other Services	0	1	0	0	1	1	2	1	11	0	0	0	0	0	0	0	0	0	0
Civilian	186	184	202	257	328	355	451	438	582	597	605	620	601	608	630	592	517	484	540
International	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	0	1	2	1
Total	238	264	336	467	566	599	718	705	839	920	1,013	1,000	977	997	989	909	853	820	866

Average on board student population

Graduate Certificate and Non-Degree Students by Service



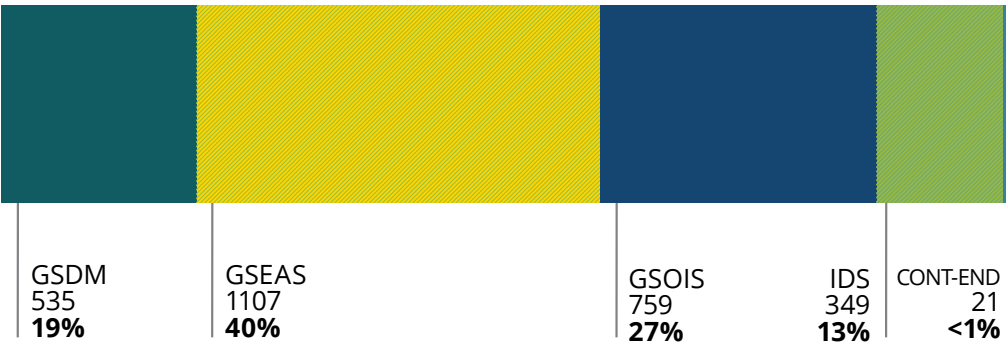
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
USN/R	93	96	163	137	161	175	80	93	103	100	99	97	98	68	72	74	94	96	111
USMC/R	27	28	37	14	12	13	20	22	17	18	20	20	17	20	18	17	24	28	45
USA/R	9	11	7	6	20	22	8	11	24	36	31	27	40	12	22	32	15	11	8
USAF/R	3	1	58	6	9	16	24	13	13	2	1	8	9	10	17	24	19	15	28
Other Services	3	6	5	3	3	1	13	2	17	1	1	0	0	0	0	0	0	1	1
Civilian	148	144	137	124	164	167	103	163	241	219	153	231	214	158	192	199	166	219	218
International	4	4	5	4	1	5	1	1	1	2	2	2	7	8	5	10	11	18	14
Graduate Certificate and Non-Degree Totals	287	289	410	293	368	398	249	304	414	377	307	385	385	276	326	356	327	387	425

Numbers may not sum to total due to rounding.

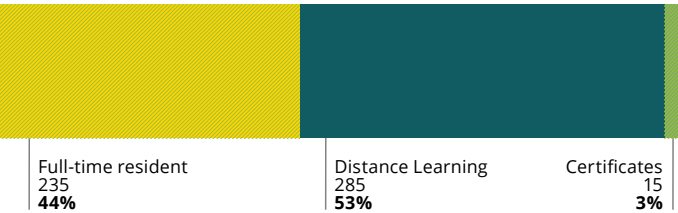
GRADUATE PROGRAM STUDENTS

By School - Average on Board 2020

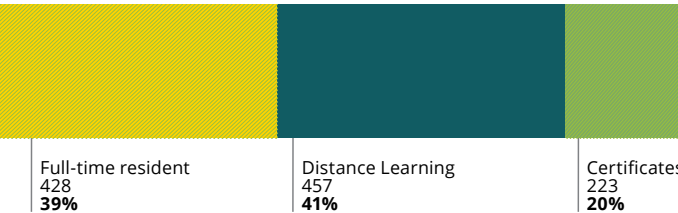
NPS (total 2771)



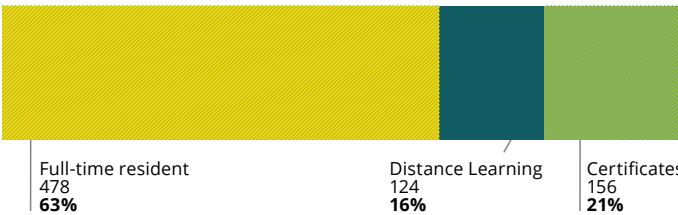
GSDM (total 535)



GSEAS (total 1107)*



GSOIS (total 759)



IDS (total 349)



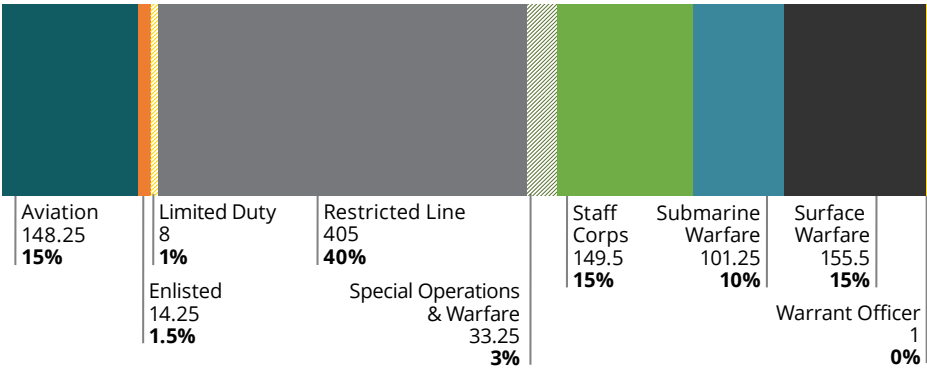
Numbers may not sum to total due to rounding.
* SE/OR Students are reflected under GSEAS



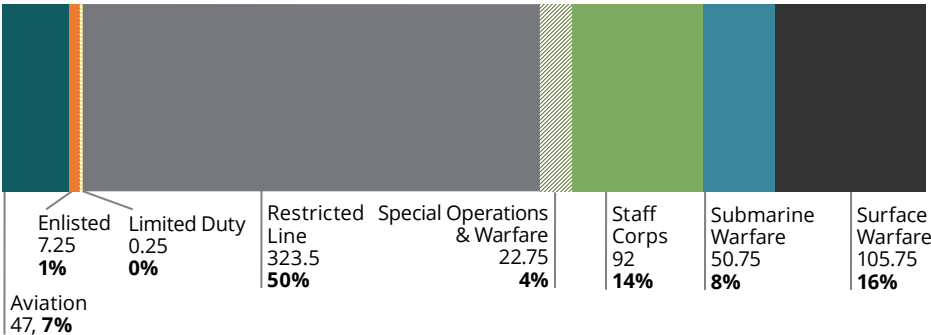
GRADUATE PROGRAM STUDENTS

By USN/R Community - Average on Board 2020

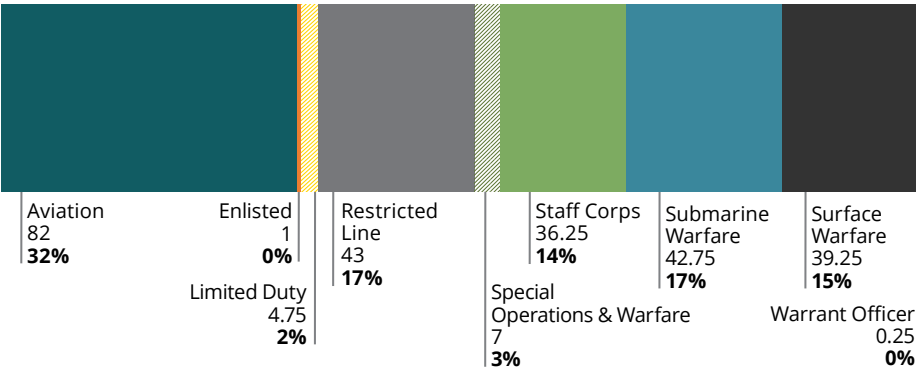
TOTAL USN/R Communities (total 1016)



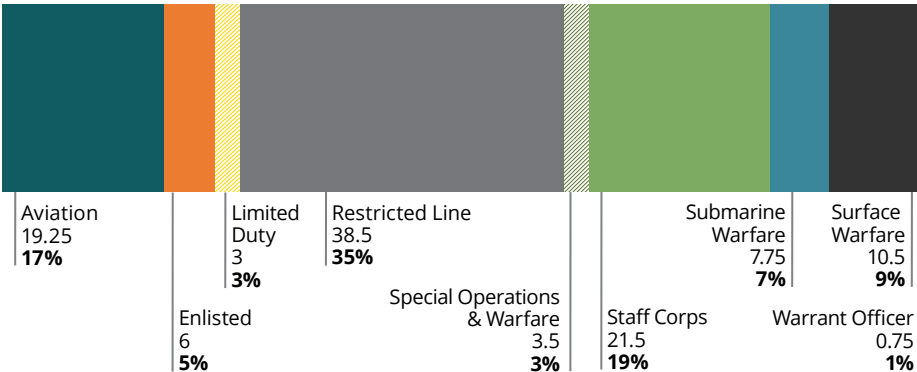
Full-time Resident (total 649)



Distance Learning (total 256)



Certificates & Non Degree (total 111)



Numbers may not sum to total due to rounding.

By Region – Average on Board 2020

A world map illustrating the percentage of the world population in each region. The regions and their percentages are:

- North America: 5%
- South America: 13%
- Europe: 32%
- Africa: 4%
- Middle East: 6%
- Asia: 36%
- Australia: 5%

The map uses different colors and patterns to distinguish between regions: North America (dark grey), South America (green diagonal stripes), Europe (blue diagonal stripes), Africa (dark blue), Middle East (yellow diagonal stripes), Asia (light green), and Australia (dark blue). A small globe icon is visible in the bottom left corner.

Military officers from more than 110 allied nations have studied at the university, often bringing their families with them. The cultural exchange builds lifelong relationships between NPS' U.S. students and their international colleagues.

Numbers may not sum to total due to rounding

IN MEASURES STUDENTS & PROGRAMS

Average on Board 2020

* Numbers may not sum to total due to rounding

GRADUATE DEGREE ENROLLMENT continued

Resident Programs	Curriculum Number	USN	USMC	Intl Military & Civilian	U.S. Civilian	Other Services	Grand Total
GSOIS							
Applied Cyber Operations	336	6	3	0	0	0	9
Computer Science	368	33	23	7	18	1	82
Computer Science (PhD)	384	1	0	0	0	0	1
Cyber Systems and Operations	326	40	1	0	0	1	42
Human Systems Integration	362	0	0	1	0	1	2
Information Sciences (PhD)	474	0	2	1	2	1	6
Information Strategy and Political Warfare	698	0	0	0	1	16	17
Information Systems & Technology	370	0	26	0	0	0	26
Information Warfare	595	0	21	0	0	0	21
Joint Cmd, Cntrl, Comm, Comp/Intel (C4I) Sys	365	0	5	1	0	1	6
Modeling, Virtual Environments & Simulation	399	0	9	4	0	1	15
Modeling, Virtual Environments & Simulation (PhD)	398	1	1	0	0	1	3
Network Operations and Technology	386	30	0	0	0	1	31
Operations Analysis	360	44	27	10	0	15	95
Operations Analysis (PhD)	382	0	2	0	0	0	2
Operations Research Logistics Analysis	361	14	0	0	0	1	15
Special Operations	699	18	1	21	0	66	106
GSOIS Total		186	120	45	21	107	478
IDS							
Civil-Military Relations	685	0	0	3	0	0	3
Combating Terrorism: Policy and Strategy	693	0	0	14	1	0	15
Europe and Eurasia	684	10	8	2	1	14	33
Far East, Southeast Asia, Pacific	682	18	11	1	1	16	45
Homeland Defense and Security	692	0	0	0	120	4	124
Homeland Security and Defense	691	12	0	1	0	5	18
Middle East, South Asia, Sub-Saharan Africa	681	16	6	1	0	22	45
Security Studies (PhD)	694	0	0	1	1	3	5
Strategic Studies	688	8	0	6	0	2	15
Western Hemisphere	683	14	4	0	0	18	36
IDS Total		76	28	29	123	83	339
RESIDENT TOTAL		649	244	125	155	306	1480

* Numbers may not sum to total due to rounding.
** Systems Engineering Analysis is an interdisciplinary curriculum shared by GSEAS & GSOIS, but it is listed here under GSEAS for simplicity.

GRADUATE DEGREE ENROLLMENT continued

Distance Learning & Hybrid Programs	Curriculum Number	USN	USMC	Intl Military & Civilian	U.S. Civilian	Other Services	Grand Total
GSDM							
Contract Management (DL)	835	4	2	0	50	7	62
Executive Master of Business Administration (DL)	805	106	17	0	0	0	123
Executive Master of Business Administration(DL-Civ)	807	0	0	0	64	0	64
Program Management (DL)	836	6	9	0	22	0	37
GSDM Total		115	28	0	136	7	285
GSEAS							
Aerospace Engineering (DL)	608	1	1	0	4	1	7
Aviation Systems Engineering (DL)	312	15	6	0	2	8	30
Electronic Systems Engineering (DL)	592	0	0	0	62	0	62
Mechanical Engrg for Nuclear Trained Officers (DL)	572	39	0	0	0	0	39
Naval Test Pilot/Mechanical & Aerospace Engineering Program (DL)	613	10	3	0	0	0	13
Reactors - Mechanical/Electrical Engineering (DL)	571	16	0	0	0	0	16
Systems Engineering (DL)	311	7	4	0	182	0	194
Systems Engineering (PhD) (Hybrid)	582	0	0	0	13	0	13
Systems Engineering Management - Systems and Program Management (DL)	722	0	0	0	39	0	39
Systems Engineering Management-PD21 (DL)	721	4	0	0	23	1	28
Underwater Acoustic Systems (DL)	535	3	0	0	14	0	16
GSEAS Total		94	15	0	339	10	457
GSOIS							
Cost Estimating and Analysis (DL)	379	1	0	1	39	0	41
Human Systems Integration (DL)	359	13	6	0	5	0	23
Information Sciences (PhD) (Hybrid)	473	0	0	0	14	0	14
Systems Analysis (DL)	363	34	5	0	8	0	47
GSOIS Total		47	11	1	65	0	124
DL Total		256	53	1	540	16	866



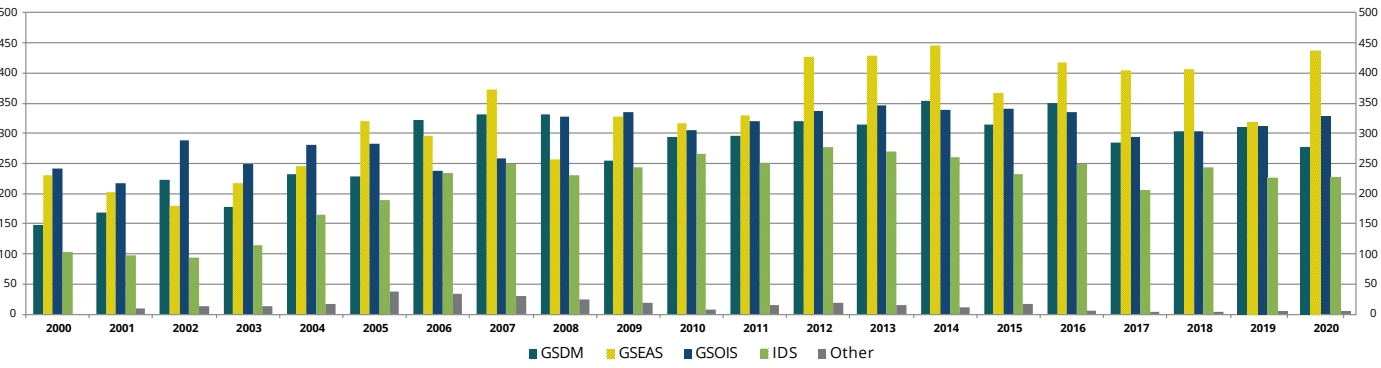
GRADUATE DEGREES CONFERRED

Graduate School of Defense Management	274
EMBA Executive Master of Business Administration	96
MBA Master of Business Administration	116
MS Contract Management	15
MS Management	38
MS Program Management	9
Graduate School of Engineering and Applied Sciences	439
EAAC — ENGINEERING ACOUSTICS ACADEMIC COMMITTEE	8
MS Engineering Acoustics	7
PhD Engineering Acoustics	1
ECE — ELECTRICAL AND COMPUTER ENGINEERING	66
MEng Electrical Engineering	28
MS Electrical Engineering	32
MS Engineering Science (Electrical Engineering)	3
PhD Electrical Engineering	3
MA — APPLIED MATHEMATICS	13
MS Applied Mathematics	13
MAE — MECHANICAL AND AEROSPACE ENGINEERING	79
MS Astronautical Engineering	9
MS Engineering Science (Aerospace Engineering)	16
MS Engineering Science (Astronautical Engineering)	1
MS Engineering Science (Mechanical Engineering)	21
MS Mechanical Engineering	29
PhD Astronautical Engineering	1
PhD Mechanical Engineering	2
MR — METEOROLOGY	8
MS Meteorology	2
MS Meteorology and Physical Oceanography	6
OC — OCEANOGRAPHY	15
MS Meteorology and Physical Oceanography	11
MS Physical Oceanography	4
PH — PHYSICS	32
MS Applied Physics	24
MS Physics	7
PhD Applied Physics	1
SE — SYSTEMS ENGINEERING	202
MS Engineering Systems	18
MS Systems Engineering	112
MS Systems Engineering Management	71
PhD Systems Engineering	1
SP — SPACE SYSTEMS ACADEMIC GROUP	16
MS Space Systems Operations	16
Graduate School of Operational and Information Sciences	327
CS — COMPUTER SCIENCE	60
MS Computer Science	52
MS Modeling, Virtual Environments and Simulation	6
PhD Modeling, Virtual Environments and Simulation	2
DA — DEFENSE ANALYSIS	101
MS Defense Analysis (Financial Management)	1
MS Defense Analysis (Irregular Warfare)	78
MS Defense Analysis (National Security Affairs)	2
MS Information Strategy and Political Warfare	20
IS — INFORMATION SCIENCES	61
MS Applied Cyber Operations	7
MS Cyber Systems and Operations	13
MS Information Technology Management	9

GRADUATE DEGREES CONFERRED continued

MS Information Warfare Systems Engineering	10
MS Network Operations and Technology	18
MS Systems Technology (Command, Control, and Communications)	3
PhD Information Sciences	1
OR — OPERATIONS RESEARCH	105
M Cost Estimating and Analysis	17
M Human Systems Integration	9
M Systems Analysis	18
MS Applied Science (Operations Research)	3
MS Human Systems Integration	1
MS Operations Research	56
PhD Operations Research	1
Graduate School of International and Defense Studies	228
NSA — NATIONAL SECURITY AFFAIRS	228
MA Security Studies (Civil-Military Relations)	1
MA Security Studies (Combating Terrorism: Policy and Strategy)	7
MA Security Studies (Europe and Eurasia)	25
MA Security Studies (Far East, SE Asia, the Pacific)	36
MA Security Studies (Homeland Security and Defense)	87
MA Security Studies (Middle East, South Asia, Sub-Saharan Africa)	30
MA Security Studies (Strategic Studies)	16
MA Security Studies (Western Hemisphere)	23
PhD Security Studies	3
Provost Oversight	7
MS Systems Engineering	4
MS Systems Engineering Analysis	3
NPS TOTAL	1275

Degrees Conferred by Academic School



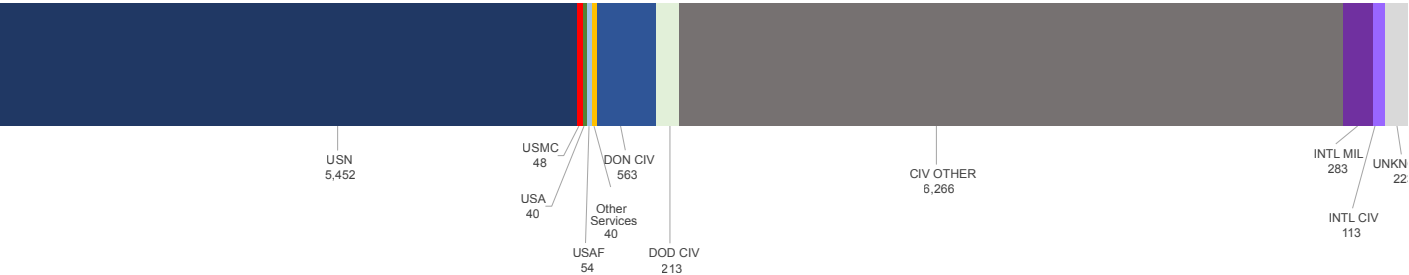
SCHOOLS	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
GSMD	148	169	223	177	233	229	322	331	331	255	293	295	321	315	354	315	351	285	303	310	274
GSEAS	231	202	179	217	245	320	295	372	257	328	317	329	426	428	446	366	418	404	407	312	439
GSOIS	241	217	289	249	280	282	237	259	327	335	305	321	337	346	338	340	335	294	303	314	327
IDS	103	98	93	115	165	190	234	249	230	243	265	250	277	269	261	232	249	206	243	227	228
Other	-	10	14	13	17	38	34	30	25	18	8	15	18	15	12	16	5	4	4	6	7
Total	723	696	798	771	940	1,059	1,122	1,241	1,170	1,179	1,188	1,210	1,379	1,373	1,411	1,269	1,358	1,193	1,260	1,169	1,275

EXECUTIVE SUMMARY

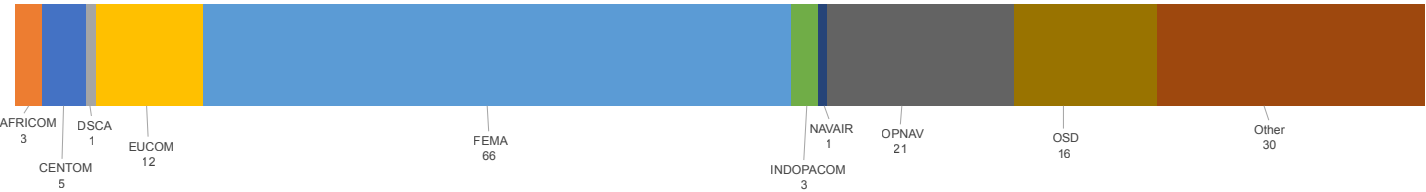
The Naval Postgraduate School (NPS) extends world-class executive education and professional development (EE/PD) programs to mid- and senior-grade professionals who are unable to take the time out of their careers to attend degree programs, or who need targeted information at their locations on their time schedules. In addition to degree and certificate courses offered for credit, Schools, Centers, Departments, Institutes and other organizations of NPS provide executive education, numerous short courses, seminars, fly-away teams and conferences to meet specific sponsors' needs. NPS' short courses do not award academic credit, but selected short courses may award continuing education units (CEUs). The primary organizations involved in EE/PD at NPS are:

- Center for Executive Education
- Center for Homeland Defense and Security
- Center for Security Cooperation Support
- Defense Resources Management Institute
- Regional Security Education Program
- Academic Units (GSDM, EAG, IS, OR, SE)

TOTAL STUDENTS BY AFFILIATION
(13,295 Total Students)



TOTAL COURSES BY SPONSOR
(164 Total Courses)



COURSES BY ORGANIZATION
(164 Total Courses)



NPS FACULTY

FACULTY BY RANK

Tenure Track

RANK	GSDM	GSEAS	GSOIS	IDS	RESEARCH	ADMIN	TOTAL
PROFESSOR	15	44	29	8	1	3	100
ASSOCIATE PROFESSOR	18	28	21	13	--	1	81
ASSISTANT PROFESSOR	13	14	18	4	--	--	49
TOTAL	46	86	68	25	1	4	230

Non-Tenure Track

RANK	GSDM	GSEAS	GSOIS	IDS	RESEARCH	ADMIN	TOTAL
SENIOR LECTURER	15	13	20	9	--	3	60
LECTURER	16	10	10	10	--	11	57
PROFESSOR OF THE PRACTICE	6	10	2	--	1	--	19
RESEARCH PROFESSOR	--	7	3	--	--	--	10
RESEARCH ASSOCIATE PROFESSOR	1	12	10	1	--	--	24
RESEARCH ASSISTANT PROFESSOR	1	10	2	1	--	1	15
ADMINISTRATIVE FACULTY	1	2	4	4	--	7	18
ASSOCIATE FACULTY	8	58	70	9	1	6	152
VISITING FACULTY	2	--	1	--	--	--	3
TOTAL	50	122	122	34	2	28	358
GRAND TOTAL	96	208	190	59	3	32	588

Graduate School of Defense Management (GSDM)
Graduate School of Engineering and Applied Sciences (GSEAS)
Graduate School of Operational and Information Sciences (GSOIS)
School of International Graduate Studies (SIGS)

NPS Faculty Distribution

	GSDM	GSEAS	GSOIS	IDS	RESEARCH	ADMIN	TOTAL
TENURE TRACK	46	86	68	25	1	4	230
NON-TENURE TRACK	50	122	122	34	2	28	358
TOTAL	96	208	190	59	3	32	588

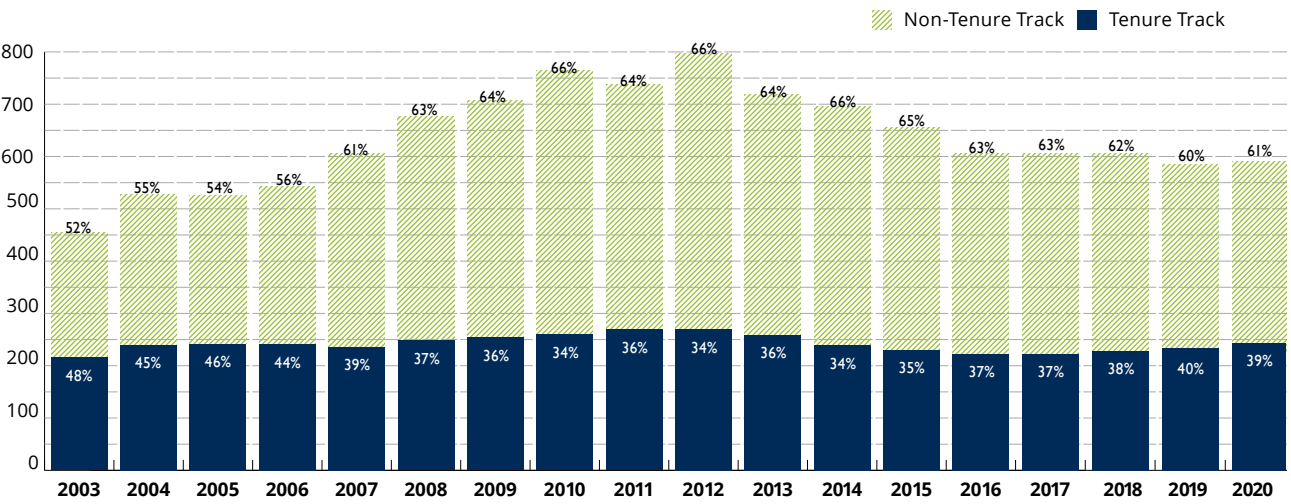
NPS Faculty Distribution

	GSDM	GSEAS	GSOIS	IDS	RESEARCH	ADMIN	TOTAL
	96	208	190	59	3	32	588
PERCENTAGE	16%	35%	32%	10%	1%	5%	100%

* Numbers are headcount not full-time equivalents (FTE)

TENURE TRACK/Non-TENURE TRACK FACULTY

Trend since 2003



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TENURE TRACK	216	240	242	241	236	248	254	260	269	270	259	239	230	223	228	231	227	230
NON-TENURE TRACK	238	288	283	301	369	428	454	504	468	527	460	457	426	382	384	379	347	358
TOTAL	454	528	525	542	605	676	708	764	737	797	719	696	656	605	612	610	574	588

Source: Faculty Administration

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
TENURE TRACK	48%	45%	46%	44%	39%	37%	36%	34%	36%	34%	36%	34%	35%	37%	37%	38%	40%	39%
NON-TENURE TRACK	52%	55%	54%	56%	61%	63%	64%	66%	64%	66%	64%	66%	65%	63%	63%	62%	60%	61%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

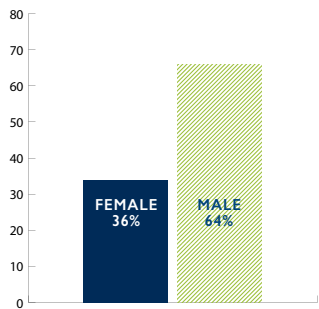
FACULTY AND STAFF 2020

By Ethnicity

	Black/African American	American Indian/Alaskan Native	Asian	Native Hawaiian/Pacific Islander	Hispanic	White	Two or More	Unknown	Total
NPS GS/WG	35	2	41	6	35	187	14	8	328
NPS FACULTY	3	3	41	0	28	491	12	10	588
TOTAL	38	5	82	6	63	678	26	18	916

By Gender

	FEMALE	MALE	TOTAL
NPS GS/WG	174	154	328
NPS FACULTY	146	442	588
TOTAL	320	596	916



PATENTS

Systems, methods, and apparatuses for determining the distance between two positions

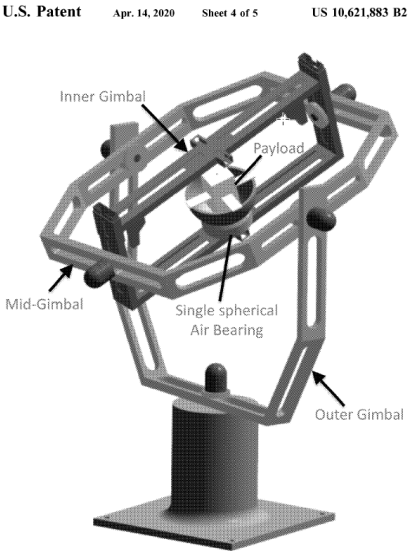
Romano, Marcello; Restaino, Sergio; Helmboldt, Joseph; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-03-10).

Systems, methods, and apparatuses for determining the distance between two positions are disclosed. The system includes a correlator, a first receiver, and a second receiver. The first and second receivers each include: an antenna, a steering mechanism, and a processor. The steering mechanism steers the antenna in an azimuthal direction and an elevation direction. The processor is configured to (i) control the steering mechanism, (ii) receive data recorded by the antenna from a plurality of sources, (iii) time-stamp the data recorded by the antenna, and (iv) control the transmission of the time-stamped data to the correlator. The correlator is configured to receive the time-stamped recorded data from the first receiver and the second receiver, and calculate a distance between the first receiver and the second receiver based thereon.

Angularly unbounded three-axis spacecraft simulator

Chesi, Simone; Romano, Marcello; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-04-14).

A method of simulating 3-degrees of freedom spacecraft rotational dynamics is provided that includes attaching a payload, using a spherical air bearing, to an inner gimbal of a 3-axis gimbal, where the 3-axis gimbal includes an outer gimbal, a mid-gimbal and the inner gimbal, using a motion controller to control motion of each the gimbal of the 3-axis gimbal, where the motion controller includes an appropriately programmed computer and a motion control motor, sensing limits of free travel of the spherical air bearing, using a position sensor, and changing a position of the 3-axis gimbal away from the limit of free travel of the spherical air bearing when the spherical air bearing approaches the limit of free travel, wherein the position change effects travel of the spherical bearing to be unbounded by the limit of free travel, wherein 4 steradians spacecraft dynamics of the payload are simulated.



Methane/oxygen rocket engine with specific impulse enhancement by hot helium infusion

Biblarz, Oscar; Hobson, Garth V.; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-03-31).

An apparatus and method to enhance the performance of rockets engines which utilize liquid methane/oxygen pro-pellants by injecting optimized amounts of pressurized hot helium gas into the combustion chamber with the propel-lants. In one embodiment, the pressurized helium gas is stored at low temperatures near those of the cryogenic propellants and is used for regenerative cooling of the combustion chamber and nozzle during rocket operation in order to raise the temperature of the helium gas before being injected into the combustion chamber.

Systems and methods for low temperature metal printing

Phillips, Jonathan; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-05-12).

A system and method of providing metal comprising objects via additive manufacturing techniques using an RES mixture. The RES process mixes a precursor compound and a chemical agent which thermally decomposes to form typically CO, H₂, NH₃, or some other reducing agent. Using the RES mixture, the additive manufacturing device reproduces an object from a sliced object model file layer-by-layer. Heat is applied to the patterned RES mixture to thermally decompose the chemical agent and reduce the precursor compound to a reduced metal species. This heating and reduction transforms the RES mixture from a general paste having little to no shear strength to an solid form exhibiting a much greater shear strength, allowing layer-by-layer generation of 3D object components.

Unconventional warfare wargame

Arias, Jeremy; Klay, Chad; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-04-07).

A board game for simulating unconventional warfare. The board game of the present invention includes hexagonal territory board pieces, resource production unit markers, and infrastructure markers for representing territory, resource production units, and infrastructure in an unconventional warfare scenario. The infrastructure markers include (1) base markers that can be placed at intersections of the hexagonal pieces, where each base marker allows a player to collect double resources and build military units; (2) population influence markers that can be placed at the intersections, where each population marker allows the player to collect resources and conduct influence attacks on neighboring infrastructure; and (3) military unit markers that can be placed at the intersections, where each military unit markers allows the player to conduct military attacks on the neighboring infrastructure.

PATENTS

System and method for light assisted friction stir processing and welding of metallic and non-metallic materials

Farmer, Joseph C.; Rubenchik, Alexander M.; Beach, Raymond J.; Deri, Robert J.; Moses, Edward I.; El-Dasher, Bassem S.; Menon, Sarath K.; McNelley, Terry; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-05-12).

An apparatus for use in a friction stir operation, such as friction stir welding (FSW) or friction stir processing (FSP). The apparatus may have a rotating tool adapted to be plunged into a material, where the material is susceptible to being softened by heating. The rotating tool may further be adapted to be advanced along a surface of the material. An optical energy generating subsystem may be used to heat a portion of the material using optical energy as the tool is advanced along the material.

Photonic compressed sensing Nyquist folding receiver

Shmel, Richard Nicholas; Pace, Phillip E.; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-01-21).

Disclosed herein is a design, simulation, and hardware build of a photonic compressed sensing Nyquist folding receiver that is able to directly undersample wideband RF signals and detect the original Nyquist zone and frequency information. According to an exemplary embodiment, this is achieved by generating a frequency modulated optical impulse train for directly undersampling the RF environment at the antenna. The impulse train undersamples the signals using an optical modulator configuration at 1550 nm and collects the detected samples in a low pass interpolation filter which is subsequently processed to extract the undersampled signals.

Automatic gunshot detection and suppression response system

Pace, Phillip E. ; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-07-28).

The invention automatically detects a gunshot at a plurality of detection and response nodes distributed in an area, determines the location of the active shooter, and deploys a suppression response to the location of the active shooter from each of the plurality of detection and response nodes to prevent the active shooter from firing further gunshots.

Chemical method to create high stability heterogeneous carbon-bonded materials

Phillips, Jonathan; Luhrs, Claudia C.; (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US) 2020-09-01).

The disclosure provides a method a method for generating a heterogeneous carbon-bonded material using an activated carbon support a solution comprising a material precursor and a chemical agent. The material precursor is typically a salt such as SnCl₂, and the chemical agent is a substance which thermally decomposes to generate reducing gases. The mixture is heated in an inert, non-reactive atmosphere to generate the reducing gases and remove surface groups from the carbon support, allowing material such as metal from the material precursor to nucleate and directly bond to the sites. The method typically utilizes high specific surface area carbon and may produce a plurality of metal particles having an average diameter of less than about 20 nm dispersed on and strongly bonded to the underlying carbon support.

System and Method for Clock-Skew-Based Covert Communication

Knebel, Erik Sean; Tummala, Murali; McEachen, John C. (The United States of America, as represented by the Secretary of the Navy, Washington, DC (US), 2020-12-29)

A system and method for clock-skew-based covert communication in which a message formed of message bits is mapped to corresponding symbols having predetermined clock skew values. For each corresponding symbol, an offset value is calculated and added to each timestamp in a predetermined quantity of outgoing TCP segments to generated altered TCP segments, such that an artificial clock skew is induced as measured by a receiver. A clock skew value is determined from each predetermined quantity of TCP segments and mapped to corresponding symbol. The symbols are then mapped to corresponding message bits, and the message is determined from the bits. In this way a message can be sent from a transmitter to a receiver in a way that is covert during transmission and deciphered at the receiver.

NPS RESOURCES

INFORMATION TECHNOLOGY AND COMMUNICATIONS SERVICES

NPS Systems

Networks	Provider	Site
EDU	CENIC	nps.edu
HPR	CENIC	hpr.nps.edu
MIL	DREN	nps.navy.mil
Public (for guests)	CENIC	Public.nps.edu
DoDNet	NPS	Monterey DoD Interconnect: DMDC, PERSEREC, DLIFLC, NRL, FNMOC, NPS
"PACBell" Commercial ISP	AT&T	Research Network

User Data

Type	2012	2013	2014	2015	2016	2017*	2018	2019	2020
Profile & network storage	19.4 TB	22.2 TB	48 TB	39 TB	43.5 TB	60 TB	126 TB	145 TB	161 TB
Group Shares	8.7 TB	37.4 TB	30.3 TB	32 TB	111 TB	117 TB	209 TB	191 TB	129 TB
Virtualized server storage/Databases	22.5 TB	75.6 TB	158.74 TB	114 TB	214 TB	258 TB	170 TB	194 TB	301 TB
Total Backup/Recovery Storage	142.8 TB	45 TB	*	130 TB	228 TB	*	*	*	340 TB
Microsoft Exchange Online	*	*	*	*	*	*	*	11.5 TB	15.4 TB
Microsoft SharePoint Online	*	*	*	*	*	*	*	1.0 TB	2.1 TB
Microsoft OneDrive	*	*	*	*	*	*	*	13 TB	109 TB
Microsoft Teams Active Users	*	*	*	*	*	*	*	1,243	4,318
Microsoft 365 Groups	*	*	*	*	*	*	*	0.2 TB	1.0 TB
Box	*	*	*	*	*	*	*	25 TB	60 TB

**Data not available prior to Microsoft 365 migrations

Educational Technology

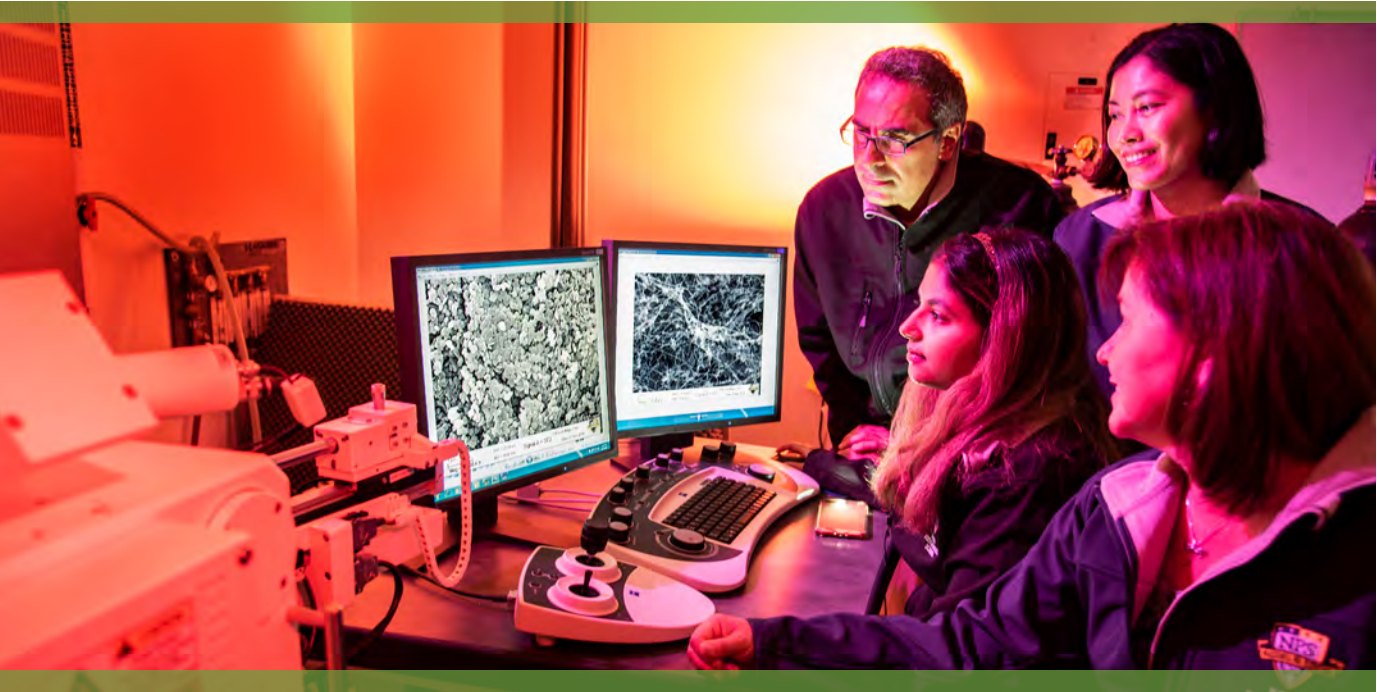
Description	2014	2015	2016	2017	2018	2019	2020
VTE & VTC SYSTEMS & SERVICES							
Video Bridge Ports	60	80	80	80	80	80	80
ISDN Channels directly connected to Video Bridge	0	0	0	0	0	0	0
ISDN Gateway Channels available to Video Bridge and VTC endpoints	253	253	253	253	253	253	253
VTC Equipped Spaces (includes meeting spaces and VTE specialized classrooms & studios)	42	42	36	57	53	43	47
VTC Conference Rooms	27	27	24	18	18	19	15
VTC or VTE Specialized Classrooms & Studios	15	15	24	39	39	24	26
AUDIOVISUAL SYSTEMS & SERVICES							
Multimedia presentation systems ⁴	133	133	130	130	130	130	N/A ⁴
Classroom AV Systems ⁵							110
Meeting Room AV Systems ⁶							26
ONLINE INSTRUCTION SUPPORT							
Resident courses shifted to Zoom/Teams/Collaborate (Q3,Q4)							623
Class hours recorded & streamed via the Internet	5,862	6,012	6,416	6,302	6,359	3,388	880
Collaborate participant hours. Tracking began FY14.	100,675	102,341	104,211	106,641	108,287	189,995	115,572

INFORMATION TECHNOLOGY AND COMMUNICATIONS SERVICES

Educational Technology (continued)

Description	2014	2015	2016	2017	2018	2019	2020
LIVE ONLINE EVENTS							
Live Streaming Events (Total Events)							20
Live Streaming Events (Total Hours)							26
Live Streaming Events (Total Attendance)							4,787
Zoom Webinars Total Events ⁷							15
Zoom Webinars Total (Hours) ⁷							20
Zoom Webinars Total Attendance ⁷							1,156
Teams Live Events Total Events							4
Teams Live Events Total (Hours)							6
Teams Live Events Total Attendance							N/A ¹
ZOOM/TEAMS SUPPORT							
Zoom/Teams Enabled Classrooms							8
Zoom/Teams Enabled Meeting Rooms							1
Zoom Meeting Sessions (Total) ⁷							42,635
Zoom Meeting (Hours) ⁷							425,921
Zoom Meeting Participants (Total) ⁷							387,980
Zoom Cloud Recordings (Total) ⁷							1.17 TB
Logins to the learning management system (not distinct users)	1,048,039	1,692,040	1,013,306	1,037,324	1,111,503	1,131,434	1,430,125
Sites (Courses and Projects) hosted on the learning management system	7,821	9,308	10,787	11,956	13,536	14,648	16,871

¹ This reflects the total number of available Video-conferencing facilities. Previous editions only accounted for facilities managed by ITACS.
² Class hours delivered through web-conferencing consists of expected growth and an increasing trend away from streaming classes via the Internet
³ Historical data not available in Teams.
⁴ Beginning with FY20, count will be kept separately on "classroom" and "meeting space" AV systems.
⁵ Includes all classroom, computer classroom, VTC-equipped classroom, FLEx classroom, VTE classroom, VTE studio, and lab AV systems supported by AV Services.
⁶ Includes all conference room, auditorium, and collaboration space AV systems supported by AV Services.
⁷ Zoom data only covers FY20 Spring & Summer quarters. Older historical data not available from Zoom.



INFORMATION TECHNOLOGY AND COMMUNICATIONS SERVICES

High Performance Computing (HPC)

Description	2014	2015	2016	2017	2018	2019	2020
HPC supercomputer processors	3,154	4,290	4,698	5,166	4,516	6,140	5,156
HPC supercomputer users	210	356	327	180 ^{§§}	474	688	741
HPC disk space	475 TB	2 PB	3.2PB	3.2 PB	3.2 PB	3.2 PB	6.5 PB
Linux computers on campus	375	300 [§]	286 [§]	242 [§]	224	173 [§]	124 [§]
Linux users on campus	500	600	722	748	704	756	740

[§]Decrease due to virtualization
^{§§}Decrease due to expired account cleanup

UNIVERSITY EDUCATION PARTNERSHIPS

Corporation for Education Network initiatives in California (CENIC)

State research and education network (CalREN) links University of California campuses and system, California State University campuses and system, University of Southern California, Cal Tech, Stanford University and the Naval Postgraduate School, as well as providing connectivity to other national high-speed networks such as LambdaRail and Internet2.

Defense Research Engineering Network (DREN)
DOD's recognized research and engineering network. Robust, high-capacity, low-latency nation-wide network that provides connectivity between and among the HPCMP's geographically dispersed high performance computing (HPC) user sites, HPC Centers, and other networks.

Source: Information Technology and Communications Services
Source: Information Technology and Communications Services



Monterey Peninsula Department of Defense Net

Regional DoD consortium with physical infrastructure linking Fleet Numerical Meteorology and Oceanography Center (FNMOC), Defense Manpower Data Center (DMDC), Naval Postgraduate School (NPS), Naval Research Lab, and Defense Language Institute – Foreign Language Center (DLI-FLC).

University and Defense Partnership Navy Higher Education IT Consortium
Naval Postgraduate School, Naval War College, and Naval Academy CIO's working to develop higher education-based collaborations to maximize effectiveness of technology use at each of the three institutions.

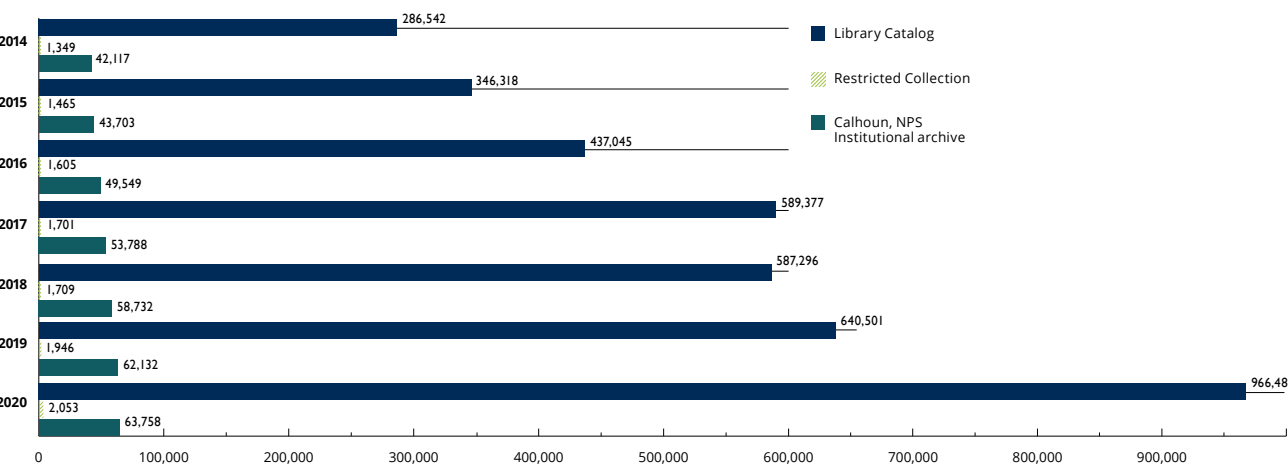
DUDLEY KNOX LIBRARY

Quick Facts

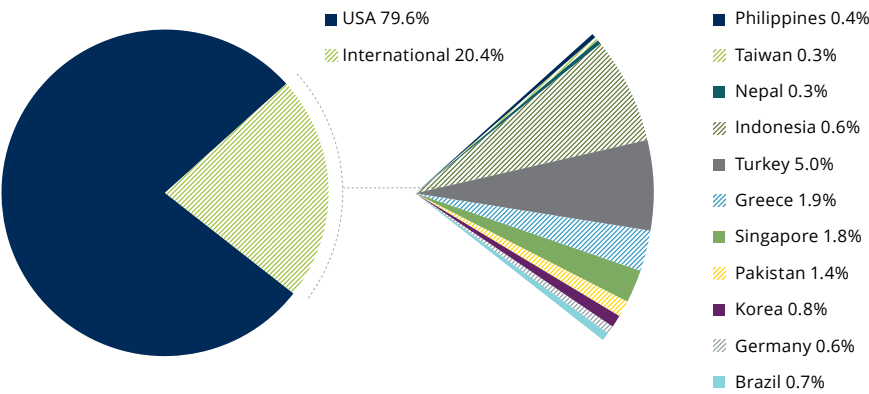
DESCRIPTION	2015	2016	2017	2018	2019	2020
Library staff FTE	28	27	26	25	21.5	22.5
Average weekly hours (Sunday-Saturday); extended hours during finals weeks	78	78	78	78	78	78
eResources available in library catalog (books, journals, reports & more)	391,486	377,192	589,377	587,296	640,051	966,484
eResources available in Restricted Collection (Restricted NPS Thesis, NPS Reports, etc.)	1,465	1,605	1,701	1,709	1,946	2,053
eResources in NPS Archive: Calhoun	43,703	49,549	53,788	58,732	63,132	63,758
On-site Library visits	313,199	280,376	281,393	272,037	260,761	108,457
Average daily library visits (on-site)	909	808	842	829	1,014	1,063
Average daily library visits (virtual)*	--	4,737	4,813	1,746	2,011	1,587
Hours students used collaborative study spaces	>8,200	8,164	24,051.75	28,267.25	28,851	12,376.50
Students receiving library instruction	2,746	2,435	2,501	2,432	2,191	1,968
Library instruction sessions offered (face-to-face and virtual)	146	126	138	149	134	118

*2018 changed to Google Analytics Sessions for counting virtual vists

Number of Electronic Resources



NPS Alumni Registered for AY2020 Library Access



Source: Dudley Knox Library

Alumni

YEAR	TOTAL
2009	1222
2010	1540
2011	1851
2012	2098
2013	2430
2014	2754
2015	3040
2016	3279
2017	3530
2018	3975
2019	4250
2020	4500

ACADEMIC FACILITIES

CLASSROOMS OF THE FUTURE (CR)

4 FLEx Classrooms with movable furniture and technology to support student-centered learning.

AUDITORIA

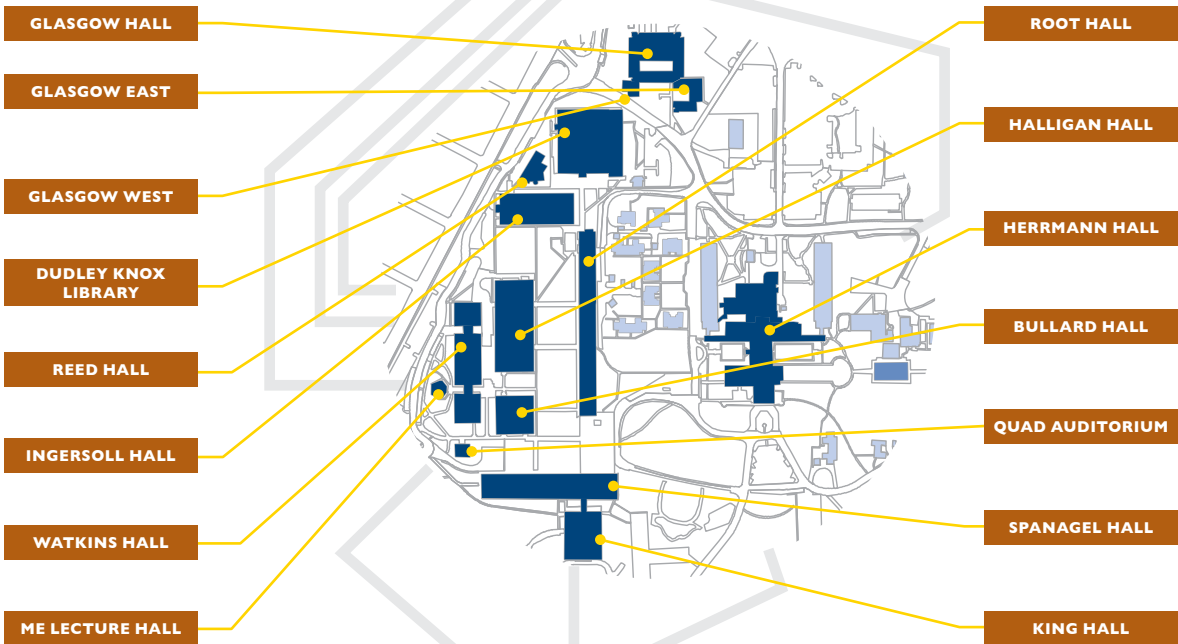
4 Large Auditorium facilities designed for conferences and similar large groups of audiences.

VIDEO CONFERENCING CLASSROOMS (VTE)

8 Video tele-education classrooms. Traditional style classrooms augmented with video-conferencing technology.

BASELINE CLASSROOMS (CR)

62 Traditional baseline classrooms with multi-media projection system and instructor computer. This is the minimum baseline technology for all traditional classrooms.



12 SYSTEMS ENGINEERING LABS

ROBODOJO (LAB)
Lab equipped with 3D printers, laser cutters, embedded computing, basic electronics, and robotic software programming for students, staff, faculty and friends to "tinker" and learn about robot components and systems.

ARSENAL (LAB)
Advanced robotic systems engineering laboratory for physically building, testing, and programming robots, such as unmanned aerial vehicles (UAVs) situated next to computation, modeling and simulation resources.

68 MECHANICAL & AEROSPACE ENGINEERING LABS

SPACECRAFT ROBOTICS LABORATORY (LAB)
Lab set up to test instructional robotic manipulators with location sensors for multiple floating robots on the artificial weightlessness test bed of granite to verify and improve autonomous control theory of spacecraft.

CAVR (LAB)
Center for Autonomous Vehicle Research supports teaching and research in the area of autonomous systems, in particular underwater, surface and air vehicles.

3 SECURE FACILITIES

SCIF, STBL, LIBRARY
NPS supports classified learning and communication in secure facilities.

9 SPACE SYSTEMS ACADEMIC GROUP LABS (LAB)

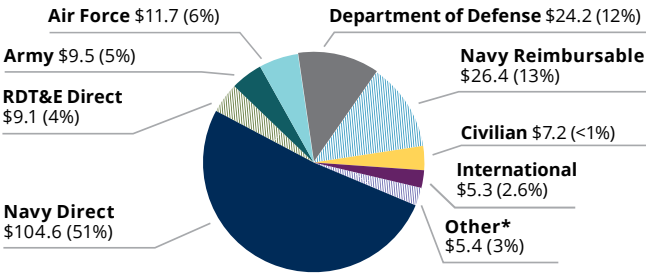
SMALL SATELLITE LABORATORY (LAB)
Labs equipped to design, build, and flight qualify space payloads. Partners of this lab include DoD space, the Jet Propulsion Laboratory and the Air Force Institute of Technology.

Source: Facilities Management (2020)

FINANCIALS

NPS FY2020 Funding by Source – Direct and Reimbursable

	PERCENTAGE	\$(IN MILLIONS)
Direct		
Navy Direct	51.4%	\$104.6
RDT&E Direct	4.5%	\$9.1
Reimbursable		
Army	4.7%	\$9.5
Air Force	5.8%	\$11.7
Department of Defense	12%	\$24.2
Navy Reimbursable	13%	\$26.4
Civilian	3.6%	\$7.2
International	2.6%	\$5.3
Other*	2.7%	\$5.4
		\$203.5**



* Other = Dept. of Energy, Homeland Security, Dept. of Justice, Dept. of State, Dept. of Veterans Affairs, Executive Office of the President, NASA, National Science Foundation
** Numbers do not sum due to rounding.

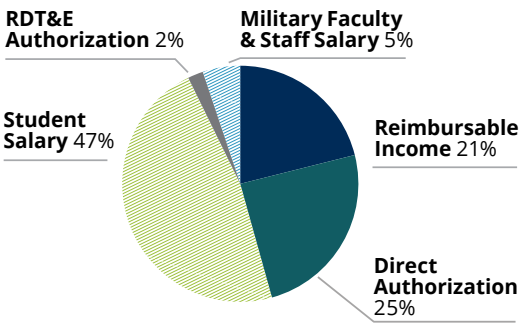
NPS FY2020 Financials By Category – Direct and Reimbursable



NPS TOTAL FINANCIAL RESOURCES

Total Operations & Military Salary – Budget by Source, FY2020

BUDGET ITEM	PERCENTAGE
Reimbursable Income	21%
Direct Authorization	25%
Student Salary	47%
RDT&E Authorization	2%
Military Faculty & Staff Salary	5%
TOTAL	100%



Source: Comptroller

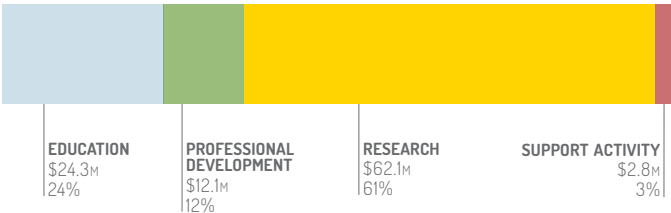
REIMBURSABLE PROGRAMS AT NPS

In the execution of its unique mission of graduate education, the Naval Postgraduate School executes a robust reimbursable research and education portfolio in accordance with federal statute*. Research programs at the university directly support the NPS mission by providing militarily relevant thesis topics that address issues from the current needs of the Fleet and Joint Force, as well as the science and technology required to sustain long-term superiority of the DON/DOD. Research varies from the fundamental to the applied and covers all levels of classification. (* U.S. Code, Title 10, Sec. 8541)

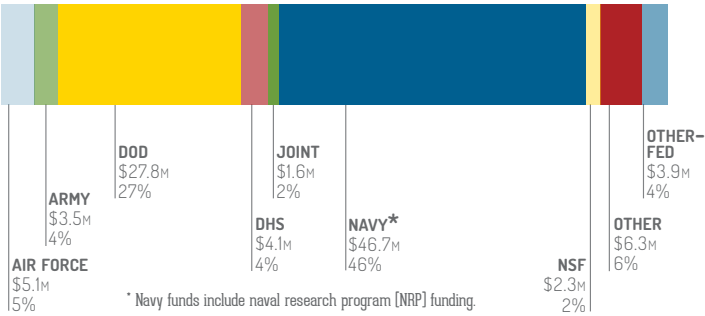
Sponsored Program Expenditures : 1 Oct 2019–30 Sep 2020

Total Expenditures: \$104.4M

By Type of Activity



By Sponsor



* Navy funds include naval research program (NRP) funding.

Research Programs

NPS Research Programs are comprised of:

Sponsored Research Programs

- Basic and Applied Research
- Individual and Group Projects
- Fleet Support
- Cooperative Research and Development Agreements with Non-Federal Entities
- Cooperative Research with Eligible Non-Federal Entities
- Naval Research Program (NRP)

Institutionally-Funded Research Programs

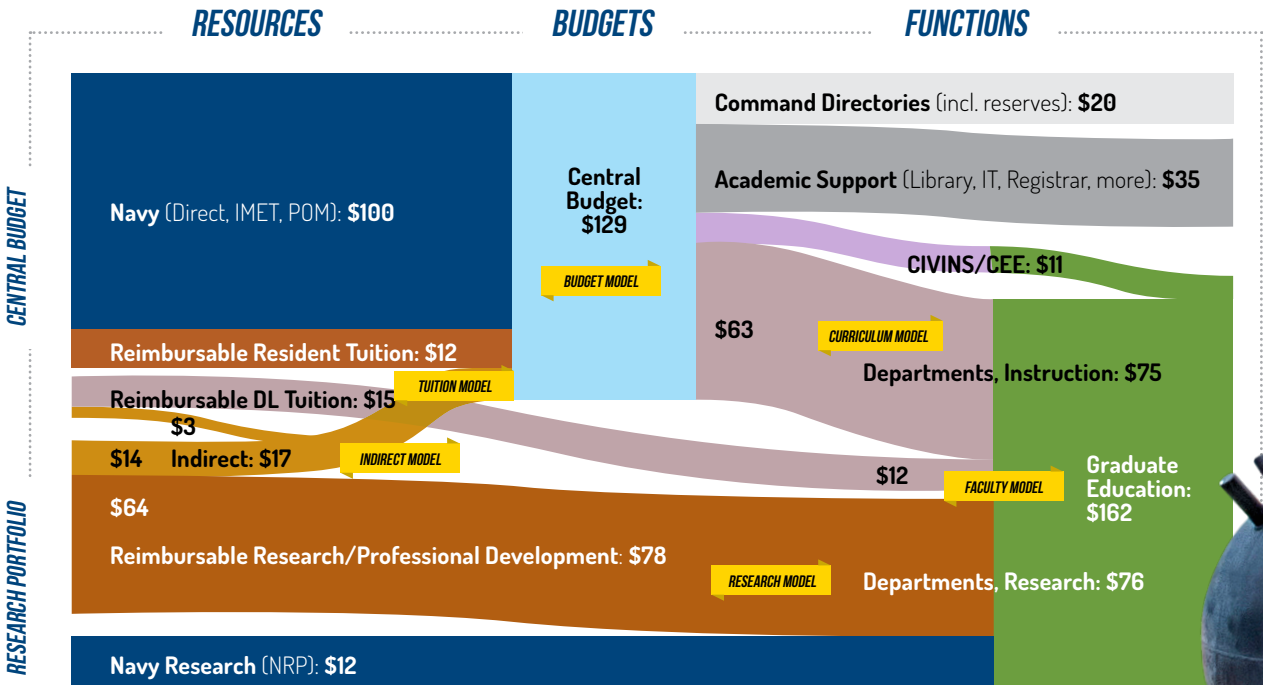
- Develop New Research Thrusts
- Complement Existing Sponsored Programs
- Support Institute for Joint Warfare Analysis
- Support Post-Doctoral Programs
- Sponsor Research Initiation Programs for New Faculty
- Recapitalize Major Scientific Equipment

Integrated Graduate Education and Research Programs

- Space Systems
- Total Ship Systems Engineering
- Combat Systems

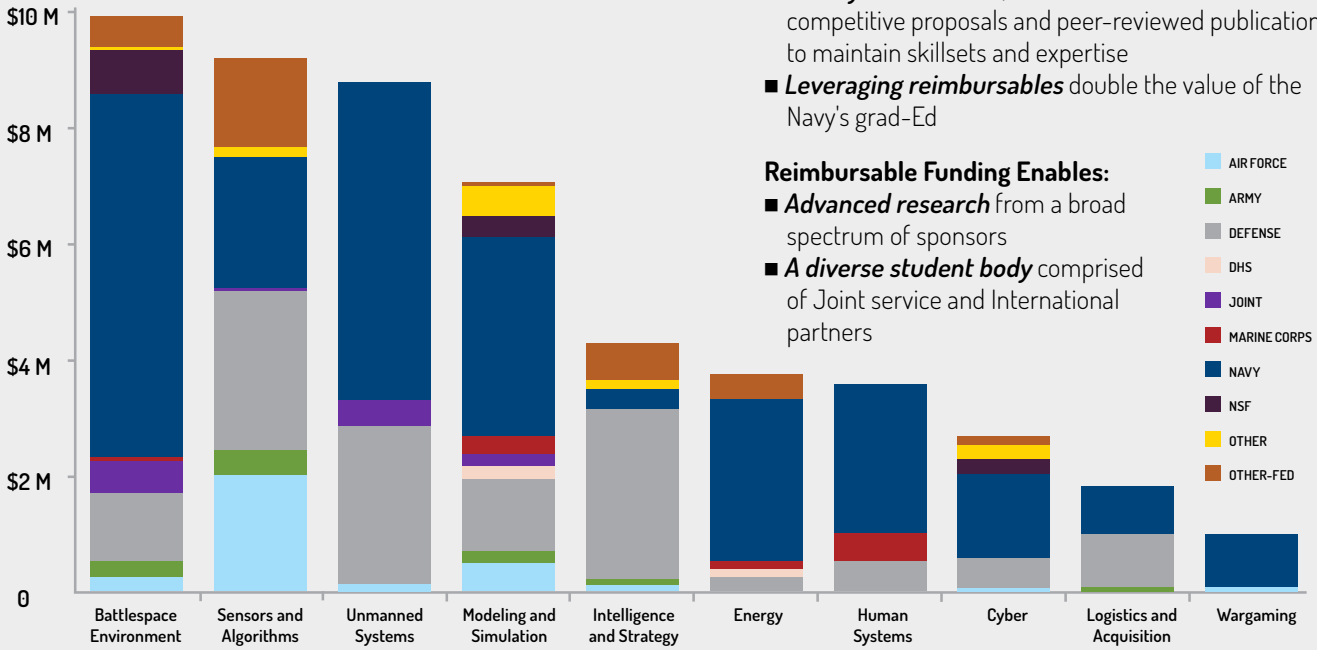
Research is conducted in every department, academic group and across the university through research centers and institutes.

HOW WE WORK



RESEARCH THRUSTS

Research at NPS is intently focused on critical issues within the Departments of the Navy and Defense. Annually, the top 10 focal areas of NPS research are directly aligned to key operational problems detailed by Naval leadership in fleet and force strategies.



Central Budget

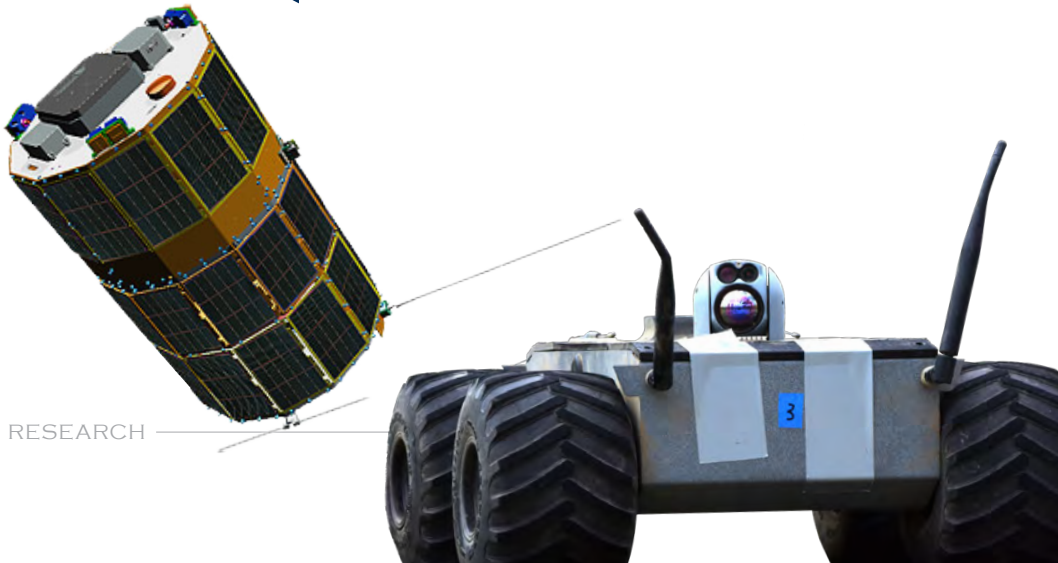
- Resources for staff and academic departments to execute core mission
- Direct and Reimbursable Funding Pots
 - Direct
 - Indirect (Reimbursable)
 - Tuition (Resident, FMT — Reimbursable)
- Centralized budgeting and oversight; decentralized execution

Research Portfolio

- Reimbursable Research
 - DON, DOD, Non-DOD, Civilian (non-federal)
- Direct Research
 - Naval Research Program (NRP)
 - Gift Fund (Foundation)
- Centralized proposal review and approval and funds receipt and acceptance; decentralized execution

REIMBURSABLE RESEARCH at NPS advances the effectiveness of the FLEET and FORCE.

NPS' reimbursable portfolio enables mission success, and advances the Navy's return on investment in the university.



NPS HALL OF FAME HONOREES

The NPS Hall of Fame recognizes the accomplishments of NPS' most distinguished alumni and friends who, through the attainment of positions at the highest levels of public service, have made the greatest contributions to society, their nations and to the Naval Postgraduate School.

Vice Admiral Edward Moore Jr. (Ret.)
(Inducted 26 Jan 2021)

Vice Admiral Jan E. Tighe (Ret.)
(Inducted 15 June 2018)

The Honorable Jack R. Borsting
(Posthumously inducted 27 Apr 2017)

The Honorable Everett Alvarez, Jr. (Ret.)
(Inducted 27 March 2015)

General Keith B. Alexander, USA (Ret.)
(Inducted 21 June 2013)

Colonel Walt Havenstein, USMCR (Ret.)
(Inducted 30 Nov 2012)

Admiral Eric T. Olson, USN (Ret.)
(Inducted 30 Nov 2012)

Admiral Stanley Arthur, USN (Ret.)
(Inducted 2 Dec 2011)

Dr. J. Phillip (Jack) London
(Inducted 2 Dec 2011)

Vice Admiral Pat Tracey, USN (Ret.)
(Inducted 3 Dec 2010)

Admiral T. Joseph Lopez, USN (Ret.)
(Presented 3 Dec 2010)

Vice Admiral Thomas J. Hughes, USN (Ret.)
(Posthumously inducted 3 Dec 2010)

General Apichart Penkitti, Permanent Secretary for Defense, Thailand (Ret.)
(Inducted 30 July 2010)

Admiral Michael Mullen, USN (Ret.)
(Inducted 11 Aug 2009)

General Michael Hagee, USMC (Ret.)
(Inducted 23 May 2009)

The Honorable Dan Albert, Mayor of Monterey (Ret.)
(Inducted 23 Feb 2007)



Vice Admiral Edward Moore Jr. (Ret.)



BOARD OF ADVISORS TO THE PRESIDENT, NPS

Non-Federal Membership

Board Member	Title	Affiliation
Mr. Donald R. Dixon	Co-Founder	Trident Capital, Inc.
Mr. William J. Haynes	Independent Consultant	
Dr. Maren Leed Holmes	Senior Professor	Johns Hopkins University
Dr. Elizabeth Paté-Cornell	Professor	Stanford University
Honorable G. Kim Wincup	Senior Advisor	Center for Strategic Intl. Studies

Federal Ex-Officio Membership

Board Member	Title	Affiliation
Lt. Gen. Anthony J. Cotton, USAF	Commander and President	Air University
Rear Adm. David J. Hahn, USN	Chief of Naval Research	Office of Naval Research
Maj. Gen. John S. Kem, USA	Commandant	U.S. Army War College
Maj Gen William Mullen, USMC	Commanding General	Training and Education Command, USMC
VADM John Nowell, USN	Deputy Chief of Naval Operations	Manpower, Personnel, Training, and Education

In 2010, a new committee comprised of the Board of Advisors for both the Naval Postgraduate School and the Naval War College was established. The committee formerly referred to as the NPS Board of Advisors is now a permanent subcommittee of the new joint committee.

NPS GRADUATE PROGRAM EXCERPTS FROM THE AY 2020 FACTBOOK

NPS Office of Institutional Research (IR)



OFFICE OF UNIVERSITY COMMUNICATIONS
NAVAL POSTGRADUATE SCHOOL

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