



NAVAL **POSTGRADUATE SCHOOL**

Systems Engineering Distance Learning **Education Summit**

31 August 2020

Dr. Wally Owen

Associate Chair for Distributed Programs & Outreach

Dr. Warren Vaneman

Dep Associate Chair for Marketing, Outreach & Engagement

Monterey, California WWW.NPS.EDU



Welcome to our Education Summit





Wally Owen, Bio











Education

BS Naval Engineering (Management & Technology), USNA 1979 MS Management (Financial Management), NPS 1992 DPA Public Administration, Golden Gate University, 2003

NPS Experience

Faculty member since 1992 GSDM, Meyer Institute, GSEAS Department of Systems Engineering

Teaching and Academic Service Experience
NPS- Acquisition, Financial, Performance and Program
Management, Public Policy, Leadership
USNA- LEAD program for Company Officers
DAU- ACQ201, SYS201 and SYS301 (DAU early days road warrior)
AA- 312 program and PO- 282, 242 and 721 programs

Associate Chair for DPO

Serve as PM for all DL programs oversee all DL functions Manage the business of distance learning Work closely with all NPS stakeholders and external sponsors

Active Duty Experience
Retired F4/F14 Naval Flight Officer
WESTPAC Cruise, CV64 USS Constellation (F14)
Around-the-World Cruise, CV43 USS Coral Sea (F4)
Officer Programs Officer, NRD St. Louis
Air Operations Officer, CVN65 USS Enterprise













Dr. Warren Vaneman Bio







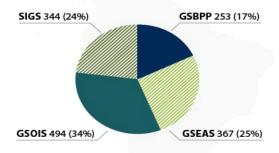
Naval Postgraduate School



ENROLLMENT 2018

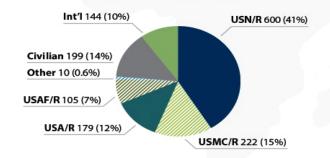
AVG. STUDENT ENROLLMENT: 2,639

AVG. RESIDENT DEGREE STUDENT ENROLLMENT BY SCHOOL



DEGREES AWARDED: 1,260

AVG. RESIDENT DEGREE STUDENT ENROLLMENT BY SERVICE



LEADERSHIP

President

Ann E. Rondeau Vice Admiral, USN (Ret.)

Provost

Dr. Steven R. Lerman

Chief of Staff

CAPT Markus J. Gudmundsson, USN

Vice Provost

Dr. Douglas Moses

Dean of Students

CDR Kenneth Ferguson, USN

Dean of Research

Dr. Jeffrey Paduan

Assoc. Provost, Graduate Education

Dr. Ralucca Gera

Assoc. Provost, Faculty Affairs

Dr. Michael Freeman

FACULTY AND STAFF

TENURE-TRACK AND TENURED FACULTY: 231

Have Ph.D	100%
Distinguished	8%

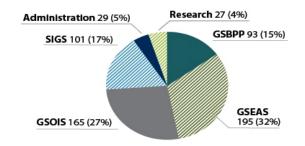
NON TENURE-TRACK FACULTY: 379

MILITARY FACULTY: 35

GS/WAGE GRADE STAFF: 342

Full-time	98%
Part-time	2%

FACULTY BY SCHOOL



GRADUATE SCHOOLS

Graduate School of Business and Public Policy (GSBPP)

Dr. Keith F. Snider

Graduate School of Engineering and Applied Sciences (GSEAS)

Dr. Clyde Scandrett, Dean

Graduate School of Operational and Information Sciences (GSOIS)

Dr. Gordon McCormick, Dean

School of International Graduate Studies (SIGS)

Dr. James Wirtz, Dean



SE Mission and Vision

The **Mission** of the Systems Engineering department is to provide a relevant, tailored, quality graduate systems engineering education in a manner that meets the needs of the United States Government in order to increase the combat effectiveness of U.S. and Allied armed forces and to enhance the security of the United States.

The Systems Engineering Department's **vision** is to be the recognized leader in defense systems engineering education and research among both its stakeholders and its peer institutions. We will create a learning and research environment balanced in challenge and encouragement that develops each student's full mastery of systems engineering principles and their ethical application in government, industry, and the community.

The close integration of teaching and research, combined with time proven "hands-on," lab-oriented pedagogy, are critical to the success of engineering education.



Accreditation and Recognition



- WSCUC Accreditation (for all of NPS)
 - Regional accreditation done on 10-year cycle
 - Curriculum Review process recognized as a "best practice"
 - Educational Effectiveness is the major focus



- ABET Accreditation (for Engineering Programs)
 - One of only three ABET accredited SE Masters Programs in the US
 - Accreditation recertified in August 2020.



- Nationally ranked by US News and World Report
 - Manufacturing, Industrial, and Systems Engineering Graduate Programs



Systems Engineering Department by the Numbers



- 43 faculty and staff
- Blend of academic, military, and industry backgrounds to provide a broad perspective on systems engineering
- Operate 13 educational programs (4 resident/9 DL) with 500 students
- Ongoing and active research in modelbased systems engineering, autonomous systems, total ship systems, systems-ofsystems, system acquisition, more....
- Systems Engineering Department founded in 2002 – our 18th anniversary is in September 2020

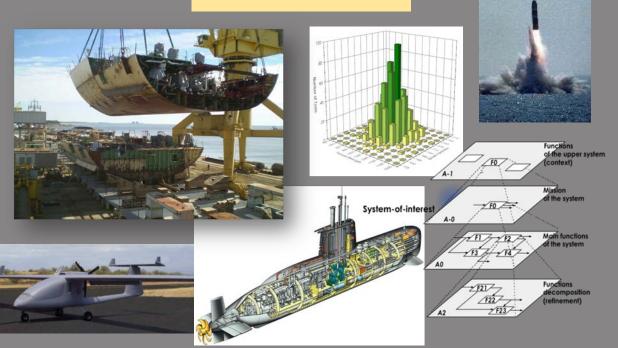
Position		Number	
Professor		3	
Associate Professor	Tenured or — Tenure Track	6	
Assistant Professor			
Professor of Practice		6	
Lecturer	11		
Research Associate	5		
Laboratory Engineer	2		
Administrative Support	3		
TOTAL		43	



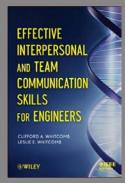
Our Faculty Teach and ...

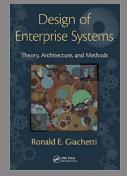


Conduct Research

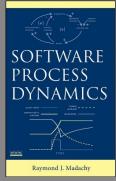


Author Books

















Graduate DL Program Overview

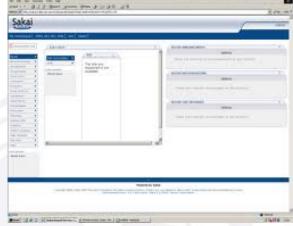
- For organizations with a strategic vision to provide worldclass systems engineering, systems integration and systems engineering management services
- Master degrees 16 courses by distance education using blended delivery approach over the internet (synchronous and/or asynchronous) either as full up curricula (311, 711, 721, 722) or as stackable certificates
- Typically degree programs offer as two courses per quarter and stackable certificate programs as one course per quarter
- PhD in SE (582) offered with one or two course option
- Each DL synchronous course offer as one continuous (3) hour session on one day per week (times/days vary)
- All synchronous sessions are delivered by ZoomGov and/or MS Teams web-conferencing and are recorded



Distance Learning Implementation

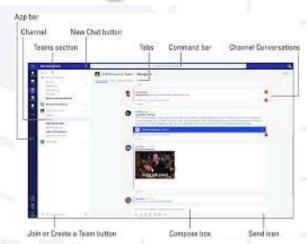
- Collaborative Learning Environment
 - Sakai web-based courseware
- Multiple Teaching Types for DL Education
 - Synchronous/Asynchronous Web Browser Based
 - Zoom for Gov and/or MS Teams used for teaching synchronously
 - Video, Voice, Chat, Desktop Sharing
 - Sakai used for teaching asynchronously
- SE Computer Lab Available Worldwide
- NPS Library Resources Available Worldwide
 - Books, Journals, Databases all on-line
- On-Site Face-to-Face Classrooms
 - Classroom facilities located in Washington,
 DC (Pax River, MD) and San Diego, CA









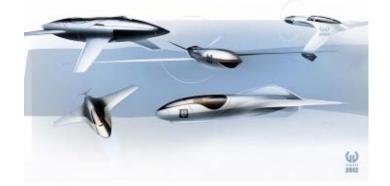




Program Themes

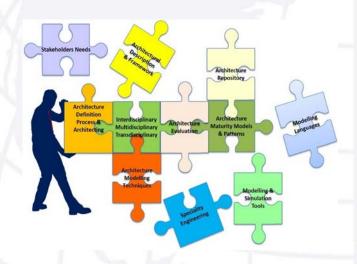
Critical Thinking – the art of analyzing and evaluating your thinking with the aim of continuously improving it





Design Thinking –a creative problem-solving approach that fosters innovative solutions

Model-Based Systems
Engineering – an analytical approach that helps manage complexity





You Are the Heart of Our SE Ecosystem

SE/SEM DL Masters Curricula

- •311 Systems Engineering
- •312 Aviation Systems Engineering (USN-TPS grads)
- •711 Systems Engineering Management System Integrated Development
- •721 Systems Engineering Management Product Development
- •722 Systems Engineering Management Program Management

DL Certificates Curricula

- •282 Systems Engineering Fundamentals Certificate
- •242 Reliability and Maintainability Engineering Certificate
- •232 Lead Systems Integrator Certificate
- New Stackable Certificate Program

DL Doctorate Curricula

•582 Ph.D. in Systems Engineering

Degrees

- MS in Systems Engineering (ABET)
- MS in Engineering Systems
- MS in Systems Engineering Management
- MS in Product Development (721 only)
- Ph.D. in Systems Engineering





Over 2500 graduates since department was founded in 2002



DL Masters Curricula Details

Curricula Requirements & Features	311	711	721	722
Undergraduate GPA	2.2	2.2	2.6	2.2
Undergraduate Engineering, Technical or Scientific degree	Yes	No	Preferred	No
College Calculus	Yes	No	No	No
Engineering, Acquisition, Product Development or related experience	3 years	3 years	5 years	3 years
Curriculum tailorable feature	Domain	Domain	Electives	Electives
On campus and industry trip feature	No	No	Yes	No
DAU equivalencies (see notes)	Yes	Yes	Yes	Yes
Supports stackable certificate concept	Yes	Yes	No	No
Up to 12 quarter transfer credits	Yes	Yes	Yes	Yes
Capstone Assessment	Project	Project	Thesis	Project
Cohort starts per year	Quarterly	Quarterly	Fall	Fall
Degree Earned	MSSE/ES	MSSEM	MSSEM/PD	MSSEM



721-Joint Executive SEM-PD21

An Executive Graduate Education Program for Defense

Offered in partnership with MIT's "Educational Consortium for Product Development Leadership in the 21st Century" (PD21)

A Distributed Learning Program with Unique Joint Focus
Joint Services
Joint Engineering & Management
Joint Government & Industry

OPEN TO ALL QUALIFIED MILITARY OFFICERS,
FEDERAL GOVERNMENT CIVILIANS AND
A LIMITED NUMBER OF DEFENSE CONTRACTOR CIVILIANS



721- Curriculum Design

Curriculum Design

Leadership in Product Development
Thesis Research

Core Courses

System Architecture

Systems Engineering Systems & Project Management

Fundamental Courses

Marketing Mgt.
Finance & Managerial
Accounting

Engineering Risk Benefit Analysis Systems Optimization

4 Elective Courses

Organizational Processes Operations Management



721- SEM-PD21 Highlights

Industry Visits

- Northeast: MIT, Lincoln Labs, EMC, NUWC-Newport, Raytheon, Army Natick Soldier System Center, Draper Labs, iRobot
- Northwest: Boeing, Microsoft, Nordstroms, ISE, NUWC-Keyport, BC Shipyard, Sage Fly-Fishing, Starbucks, Amazon
- Silicon Valley: Lockheed-Martin, Apple, Sun Microsystems, Cisco, Brocade Networks, Intel, Northrop-Grumman, Google, Tesla
- Southwest: Honeywell, Raytheon and Boeing
- Hawaii: Hilo Hattie, Naval Shipyard, Nova Drydock, A/F Space Ops, TIC, PACOM, MITRE, NOAA, UofHI, Pelatron, Navatek, Seal Delivery Team-1, Kona Scientific, Haleakala Solar,
- Midwest: Chicago Board of Trade, Boeing, Motorola Mobility, Product Development Technologies, Northrop-Grumman, Ford
- International: Amsterdam, Singapore and Rome

Symposia/Sponsor events:

- MIT- PD21 consortium and various SE related research symposia
- INCOSE, INFORMS & other professional symposia/conferences
- NPS Systems Engineering Educational Continuum (SEEC)



721 Student Thesis Impact

NPS PD21 alumni, John Gwin, (earned MSSEM in 2017) Senior System Engineer at NSWC Panama City, FL is awarded the 2019 MAVERICK award from USSOCOM at the Special Operations Forces Industry Conference (SOFIC) in Tampa, FL for changing the requirements on the Seal Delivery Vehicle, which resulted in budget and schedule improvements for the MK-11

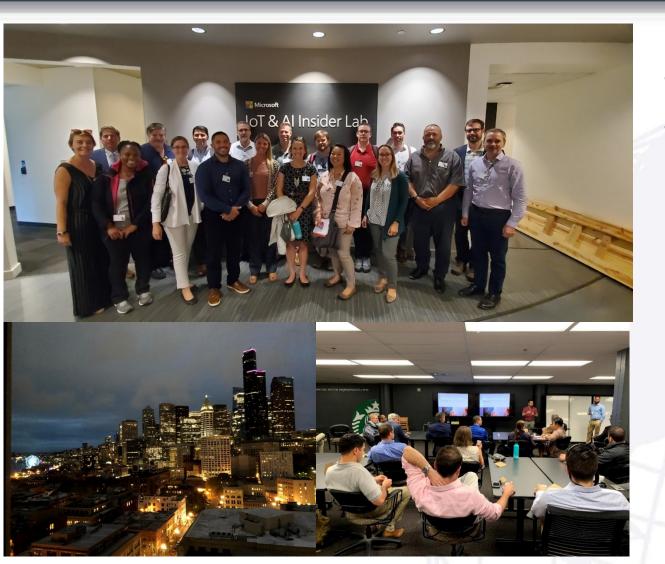
SDV Program.

Thesis Title: Design,
Certification, and
Maintenance Criteria for Wet
Combat Submersibles (classified)





721 Industry Trip to Seattle June 2019



The PD21 Program includes industry trips to learn how industry does systems engineering, product and service development, and learn other industry best practices

- Amazon
- Starbucks
- Microsoft
- ProductCon
- (Netflix and others)
- NAVSEA Keyport



POSTGRADUATE 722 Army DACM Curriculum Design

Qtr	Yr/Qtr	Course Title	Course Title	
1	FALL	Probability and Statistics for HSI	Effective Interpersonal and Team Communications	
2	WTR	Fundamentals of Engineering Project Management	Fundamentals of Systems Engineering	
3	SPRG	System Suitability	Contracting	
4	SUM	System Verification & Validation	Modeling & Simulation in Acquisition	
5	FALL	System Manufacturing, Development & Production	Engineering Economics and Cost Estimation	
6	WTR	Foundations of Cyberspace Operations	Management of Advanced Systems Engineering	
7	SPRG	Systems Software Engineering	SEM Capstone Project	
8	SUM	System Evolution & Technology Assessment	SEM Capstone Project	

SE Certificate

Sponsor Required

Elective

Capstone



SEM Capstone Project – Army

Winning team for the capstone competition. *Soldier-borne sensors* – the use of UAVs for over-the-hill reconnaissance. The team used a UAV to capture videos at Fort Ord, and then used over 50 human subjects to evaluate the ability of soldiers to use the video capture to obtain situational awareness.

2019 December grads: MAJ Ronnie Bush CPT Carlos Sheiloh MAJ Earl Dean CPT Eric Kim MAJ Amy Miranda





Stackable Certificate Overview

- The SE Department is partitioning its DL program offerings into stackable certificates
- Stackable certificates will enhance the value proposition to sponsors and students
 - Sponsors can fund only those certificates for which they have an immediate need
 - Students will be able to earn a MS degree by adding together certificates
- Supports new Engineering & Technical Management career field initiative and aligns with competency based frameworks
 - Offers a customization approach to advanced education in systems engineering and systems engineering management
 - Provides workforce developers SE relevant options in fundamental, core and specialization areas in time sequenced fashion



POSTGRADUATE Stackable Certificates lead to Degree

- SE offers DL graduate certificates and degree programs that are tailorable to sponsors and their students
- Stackable certificates can meet master's degree curricula requirements leading to MSSE, MSES or MSSEM degrees
- Certificates are identified by tiers and are typically taken in sequence but not necessarily as it varies by certificate
- Each tier certificate can be tailored dependent on the ultimate curricula (311 or 711) and degree desired

Tier I	Tier II	Tier III	Tier IV
SE	SE/SEM	SE/SEM	SE/SEM
Fund Ce	ert Core Cert	Domain Cert	Cap Cert
pick	pick	pick	pick
one	one	one	one
4 Course	es 4 Courses	4 Courses	4 Courses



Stackable Certificate 311 Design

Qtr	Yr/Qtr	Course Title Course Title		
1		Fundamentals of Systems Engineering	Probability and Statistics for SE	
2		Fundamentals of Engineering Project Management	Capability Engineering	
3		System Suitability	Engineering Economics and Cost Estimation	
4		SE CERT Focus Course and/or 311 Elective	Systems Architecting and Design	
5		SE Domain Specialty Track	Systems Integration and Development	
6		SE Domain Specialty Track	Capstone Project	
7		SE Domain Specialty Track	Capstone Project	
8		SE Domain Specialty Track	Capstone Project	

Tier I SE Certificate Tier II
SE Core Certificate

Tier III SE Domain Certificate Tier IV SE Capstone



Stackable Certificate 711 Design

Qtr	Yr/Qtr	Course Title Course Title		
1		Fundamentals of Systems Engineering	Effective Interpersonal and Team Communications	
2		Fundamentals of Engineering Project Management	Probability and Statistics for HSI	
3		System Suitability	Engineering Economics and Cost Estimation	
4		SE CERT Focus Course and/or 711 Elective	Human Factors in Systems Design	
5		SEM Domain Specialty Track	Risk Analysis & Management of Engineering Systems	
6		SEM Domain Specialty Track	Management of Advanced Systems Engineering	
7		SEM Domain Specialty Track	Capstone Project	
8		SEM Domain Specialty Track	Capstone Project	

Tier I SE Certificate Tier II
SEM Core Certificate

Tier III SEM Domain Certificate Tier IV SEM Capstone

SE Certificates

- 130 SE Capstone (Capstone)
- 131 Systems Capability & Design (Core)
- 132 System of Systems Engineering (Domain)
- 133 Model-based Systems Engineering (Domain)
- 134 Aviation Systems (Domain)
- 135 Systems Test & Evaluation (Domain)
- 136 Directed Energy Systems (Domain)
- 137 System Safety Engineering (Domain)
- 138 Digital Engineering (Domain)



SEM and Existing Certificates

SEM Certificates

- 170 SEM Capstone (Capstone)
- 171 Systems Integrated Development (Core)
- 172 Systems Technology & Advancement (Domain)
- 173 Systems Program Management (Domain)

Existing Certificates

- 282 Systems Engineering (Fundamentals)
- 232 Lead Systems Integration (Domain)
- 242 Reliability & Maintainability Engineering (Domain)



SE Fundamentals 282 Certificate DL 4 quarters	SE/SEM Core Certs 131-SCD/171-SID DL 4 quarters	SE/SEM Domain Certs 232/242/130s/170s DL 4 quarters	Other Domain Certs Data Science/Others DL 4 quarters
3 + 1 focus course	4 courses	4 courses	4 courses
Project-based	Project-based	Project-based	Project-based
Stackable	Stackable	Stackable	Stackable
25-30 per cohort	25-30 per cohort	25-30 per cohort	25-30 per cohort

Tier II ~ TBD

Tier I ~ 100 students



	Stackable Certificates Tier I- SE Fundamentals	SE/SEM Capstone 130-SEC/170-SEMC	SEM Masters 711/721/722	SE Masters 311/312	PhD in SE 582
	Tier II- SE/SEM Core	DL 4 quarters	DL 8 quarters	DL 8 quarters	Resident/DL 12 quarters
L'AIR BARRA BARA BARA BARA BARA BARA	Tier III- Domain Focus Tier V- Capstone Final	4 courses	16 courses full up	16 courses full up	6 courses min
THE STATE OF THE S	All curricula landing to a	Capstone Project	Thesis/Project	Capstone Project	Dissertation
H	All curricula leading to a master's degree are	Stackable	4 Stackable Certs	4 Stackable Certs	Tailored to each
a V	designed for stackable certificate completion or				
	can be taken as a full up	25-30 per cohort	25-30 per cohort	25-30 per cohort	3 per quarter
97.0 200	DL degree program	Tier IV- Final	~100 students	~200 students	~15 students

Tier III ~ TBD

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Tier III- Other Depts



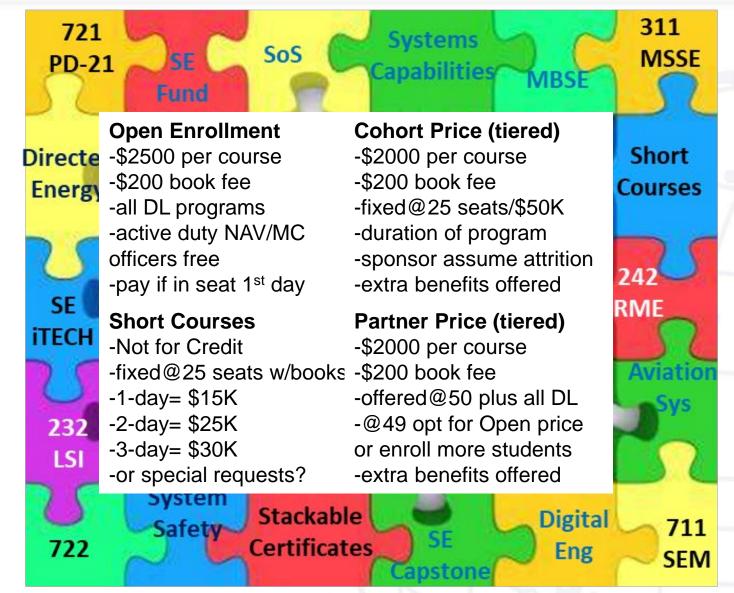
582- PhD in Systems Engineering

- Candidates can apply to start any quarter
 - Rolling admissions process
 - \$2500 per course without books (\$200 extra book fee)
- Program tailored to the individual
- Nominally \$30K for degree (12 course segments)
 - Minimum of six (6) courses above the masters
 - Typically six (6) dissertation related segment
 - Possible to complete with published minimum of three (3)
 - Option for 1 or 2 courses per quarter (2-5 years)
 - Must pass comprehensive exams before commencing dissertation research
 - Limited campus visits as required
 - Typically to meet with advisors and take exams

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POSTGRADUATE SE Distance Learning (DL) Tuition Pricing





SE iTech Outreach Seminar

What is an SE iTech Outreach Seminar?

 A Systems Engineering Innovation & Technology Outreach Seminar for Research, Education and Practice

What is purpose of SE iTech Outreach Seminar?

- The SE iTech Outreach Seminar offers two-hour lectures on SE related Innovation and Technology topics important to our SE sponsors and stakeholders delivered onsite or by virtual methods at key Navy & DOD commands or regional areas @ No Cost
- It offers the engineering and technical management workforce a relevant learning opportunity led by SE faculty sharing cutting-edge engineering and engineering management innovations and technology advances in research, education and practice

How are SE iTech Outreach Seminars scheduled?

- SE leadership picks topics of interest and locations based on technology trends, faculty interests and/or workforce concentrations
- SE sponsors and stakeholders can request specific topics for their commands or workforces www.nps.edu



POSTGRADUATE SE Education Benefits for Sponsors School

- a shortened timeframe to develop educated leaders for the engine that drives SE innovations
- more satisfied customers through systems-oriented design, management and engineering
- immediate application of learned knowledge and skills to current, as well as future, programs or projects
- retention of key leadership talent in a highly competitive market environment
- utilization of state-of-the art SE concepts and tools
- opportunity to tailor the curriculum and the educational experience to corporate needs
- access to the latest advances in systems engineering

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Education Summit Summary

- ✓ Highly ranked & accredited graduate programs
- ✓ Knowledgeable, skilled, and experience in delivery of DL education content
- √ Large DL student body (average 350-400 enrolled)
- ✓ Large and diverse faculty with relevant experience for SE of large, complex weapon systems in the DoD
- ✓ Focus on critical thinking, design thinking and MBSE
- ✓ Highly tailorable SE and SEM degree programs with new emphasis on time sequenced stackable certificates
- ✓ Open tuition price \$2500 per course but tiered pricing to \$2000 per course for sponsors doing more business
- ✓ Active research in department rich, relevant projects
- √ Visit SE DL website at https://nps.edu/web/seet/distant



People to Know

- Chair, SE Department: Ron Giachetti

 <u>regiache@nps.edu</u>
 - **–** 831-656-2670
- Associate Chair DPO: Wally Owen wowen@nps.edu
 - Distance Learning, Director of Programs and Business
 - **831-402-6086**
- DepAssoc Chair MOE: Warren Vaneman wvaneman@nps.edu
 - Distance Learning, Program Manager
 - 571-364-5126
- Education Technician: Heather Hahn hlhahn@nps.edu
 - Academic administrative support for students and sponsors
 - **-** 585-309-4163
- GEAC Student Support: GEACStudCoord@nps.edu
 - Program support for students
 - 831-656-3579

What to Expect from Us: Availability, Help, Advice, Action



NAVAL POSTGRADUATE SCHOOL

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