

# Systems Engineering and Analysis (SEA)

## Curriculum Brochure



## Naval Postgraduate School, Monterey, California

*"Bringing the technical to the tactical"*



The Best Curriculum in the world for learning HOW to engineer,  
to lead, and to manage military transformation.

<http://www.nps.navy.mil/sea>

## Some Frequently Asked Questions:

### When do students start?

Students start in January and July of each year, and graduate 18 months later.

### Who is the primary audience?

Naval officers from the **unrestricted line** are the primary audience. Since the projects tend to look at broad Naval issues, all officers are welcome, but especially those from the **surface, aviation, and subsurface** communities.

### Do I write a thesis?

No, but you must contribute significantly to the group project report.

### Will this curriculum help me in my future Naval career?

**Yes!**

If you anticipate a role in the transformation of the military, this is the curriculum for you.

If you are an **unrestricted line officer**, this curriculum provides a robust **blend of technical and war-fighting** education.

This education will make you a better **department head**, a better staff officer, and ultimately, a **better commander**.

### What is Systems Engineering and Analysis (SEA)?

**Systems Engineering** applies the engineering thought process to the design and development of large, complex systems. Systems engineers analyze the **need** for a system, determine its **operational concept**, develop functional requirements, produce the system **architecture**, allocate the requirements among sub-systems, **manage the design** of the sub-systems, assure that the final design is integrated, **assess any trade-offs** made, and then implement and test the solution.

**System Analysis** examines existing systems to better understand them. This understanding is then used to determine and **choose** between alternatives for system improvement and employment. Students learn and apply modeling, optimization, simulation, and **decision making** under risk and uncertainty.

**Systems Analysis provides key insights for the improved operation of existing complex defense systems.**

The curriculum was previously called **Systems Engineering and Integration (SEI)**. It was renamed and revamped in 2002 to emphasize the role and importance of **analysis**.

### Is SEA useful for a warfighter?

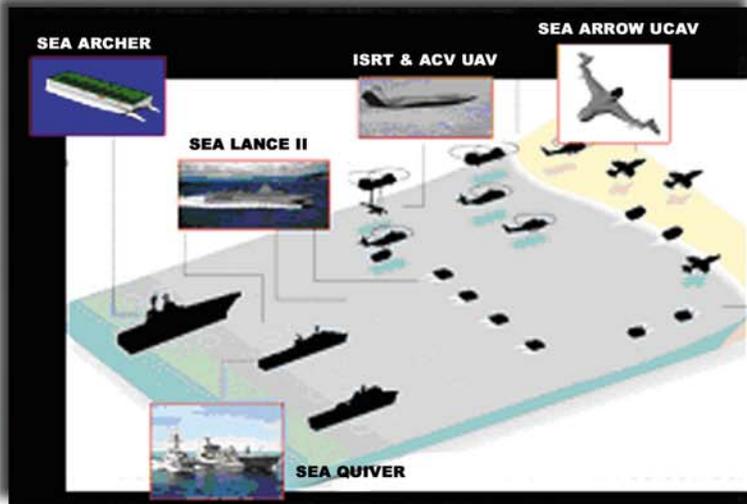
***Absolutely.*** Skills learned in this degree program will deepen your understanding of how the Navy **builds and fights large systems**. We also include courses that complete your **phase one of JPME**.

### What skills would I develop in these degree programs?

Topics of study include technology (sensors, weapons, information systems, networks, C41) and techniques (combat simulation, modeling, optimization, project management, fundamentals of systems engineering). Each year, there is a campus-wide systems engineering project, and the SEA students manage it. Graduates also earn **defense acquisition certification credits**.



## What are some examples of the projects that SEA students work on?



Last year, SEI students developed the concept and designed a force for **combat in the littorals**. This force included UAV combat aircraft; UAV ISRT aircraft; small fast fighting ships; a new, very fast automated carrier built from the keel up to support UAVs; the command and control network; the logistical support system and ships; and several new weapon systems such as a Free Electron Laser for point defense. They developed and tested the operational concept through **campaign analysis**. Other student groups on campus designed the pieces to the SEI specifications and then SEI reassembled the total system and checked that it was integrated.

## What can I expect?

Six quarters (1.5 years) of academic challenges with direct application to current problems of interest to DoD and the Navy.



## Will this curriculum help me after I leave the Service?

**Yes!** A recent survey by the University of Virginia found:

*"Systems engineers are ranked among the highest paid for any engineering discipline. Systems engineers are leaders among engineers because they are educated in project management. The Department of Labor Statistics states 'Median annual earnings' for engineers at senior managerial levels were about \$90,000."*

## What is this year's SEA project?

This year, SEA students are designing a concept and force for **expeditionary warfare**. The project begins with an **analysis** of the status quo. Then starting from a clean sheet of paper, we begin to design. These designs include the **operational concepts**, the **ships**, the aircraft, the ground vehicles, the **logistical system**, the **command and control system**, as well as many other pieces. This is expected to be a multi-year project, and to involve over 100 students.

## Are there any prerequisites to get into the program?

A basic math and science background as evidenced by past academic achievements. Students with undergraduate engineering degrees will be admitted to a program leading to a Master of Science in Systems Engineering. Other students are admitted into a program leading to a Master of Science in System Analysis.



## What is the impact of the SEA projects?

The project results are widely disseminated. Executive Summaries of last year's project were read by or briefed to the **CNO** and the **Defense Science Board**, among many others. The student work had a great visibility and an **impact on major policy discussions**.

Students who lead and participate in the campus-wide projects leave NPS with an unparalleled grasp of the technical, strategic, and tactical issues surrounding an important Navy Problem.

## How is life in Monterey?

**Fabulous.** There is good military housing, good schools, great weather, and world-class recreational activities. Monterey is a fabulous place to spend a shore tour!



## How do I get orders?

To start, tell your detailer you want to study SEA (Curriculum 308) at NPS!

## Who can I contact for more information?

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