2022 Educational Skill Requirements
Systems Analysis
Subspecialty 3211
Curriculum 363

1. Curriculum Number: 363

2. Curriculum taught at Naval Postgraduate School.

3. Curriculum Length in Months: 24 months

4. Academic Profile Code Required: 335

5. The officer must understand the fundamental concepts and be familiar with the basic functional areas of Systems Analysis within the Department of Navy (DoN) and the Department of Defense (DoD) including:

a. SYSTEMS ANALYSIS (Overall Education Skill Requirement (ESR)): The graduate of this curriculum will understand and be able to apply the basic principles of systems analysis as a basis for aiding key decisions on force requirements, weapon systems, existing and proposed DoN/DoD policies, and other defense matters. The following numbered ESRs support this high-level objective.

b. BASICS (ESR #1): The graduate will possess the mathematical skills required to support graduate study in operational analysis and have the ability to use computers to aid in analysis.

c. UNCERTAINTY FUNDAMENTALS (ESR #2): The graduate will be well versed in uncertainty fundamentals for systems analysis, including applications of probability, statistics, data analysis, and modeling uncertainty.

d. SIMULATION (ESR #3): The graduate will be able to construct and utilize Monte Carlo simulations of combat and other processes that evolve in time and will be able to deal with statistical issues associated with the need for replication.

e. TACTICAL ANALYSIS (ESR #4): The graduate will be able to apply operations analysis methods to tactical and operational problems including tactical decision analysis.

f. COST ANALYSIS (ESR #5): The graduate will understand the methods and practice of cost analysis including various cost models, with particular emphasis on the relationship of effectiveness models and measures to cost, and applications in cost-benefit analysis.

g. RISK BENEFIT ANALYSIS (ESR #6): The graduate will be able to apply the principles of probabilistic risk assessment in the context of systems analysis decision problems. This includes a framework for balancing risks and benefits, and analysis under conditions of large financial and technological uncertainties.

h. OPTIMIZATION (ESR #7): The graduate will be able to formulate and solve a wide variety of optimization problems with particular emphasis on applications in optimum allocation of scarce resources and multi-year capital budgeting.

i. PRACTICE (ESR #8): The graduate will have gained experience in all aspects of analytical studies including review and critique of the work of others; as well as participation in the conduct of an analytical study. Review and critique to include the ability to highlight critical assumptions, recognize strengths and weaknesses of applied analytical methodologies, and

evaluate study recommendations. Practice in the design and conduct of an analytical study includes the skills to formulate problems, use the analytical process to define study requirements, and apply appropriate analytical methodologies. Practice also includes demonstrating proficiency in presenting results both orally and in writing.

j. SYSTEM ANALYSIS CONTEXT (ESR #9): The graduate will have completed an approved option sequence in Defense Resource Management, or another approved option sequence in a particular defense systems area in which systems analysis may be applied.
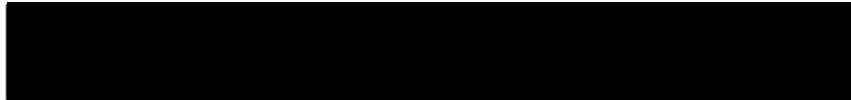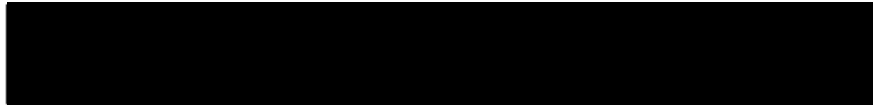
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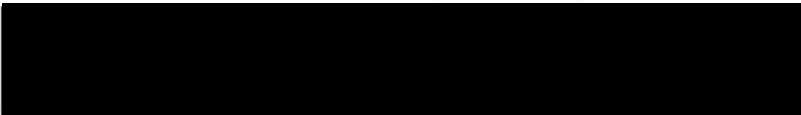Director, N71   '0   [Date]

2022 Educational Skill Requirements
Operations Analysis
Subspecialty 3211
Curriculum 360

1. Curriculum Number: 360

2. Curriculum taught at Naval Postgraduate School.

3. Curriculum Length in Months: 24 months; 21 months for MAS requirements + 3 months (1 academic quarter) to accommodate Joint Professional Military Education requirements.

4. Academic Profile Code Required: 325

5. The officer must understand the fundamental concepts and be familiar with the basic functional areas of Operations Analysis within the Department of Navy (DoN) and the Department of Defense (DoD) including:

   a. FUNDAMENTALS (Educational Skill Requirement (ESR) #1): The graduate will possess the mathematical and advanced computer programming skills required to support graduate study in operations research and have the ability to use computers to aid in analysis.

   b. PROBABILITY, STATISTICS, AND DATA ANALYSIS (ESR #2): The graduate will be well-versed in applications of probability, statistics, data analysis, and machine learning to the modeling and analysis of a broad range of military decision problems.

   c. OPTIMIZATION (ESR #3): The graduate will be able to formulate and solve a wide variety of optimization problems and understand state-of-the-art algorithms used to solve linear, nonlinear, network, dynamic, and integer programs.

   d. STOCHASTIC MODELING (ESR #4): The graduate will be able to formulate a wide variety of stochastic models; calculate measures of performance for them; and be well-versed in a broad range of advanced applications of continuous- and discrete-time Markov chains, homogeneous and non-homogeneous Poisson processes, queueing theory, and renewal processes.

   e. SIMULATION (ESR #5): The graduate will be able to employ simulation methods to model situations of interest to the defense community, be able to formulate, implement, and analyze simulations using state-of-the-art design-of-experiments techniques to efficiently explore high-dimensional spaces and make informed recommendations.

   f. SYSTEMS ANALYSIS (ESR #6): The graduate will be able to apply systems analysis concepts as a basis for making key decisions on force requirements, weapon systems, and other defense problems, with particular emphasis in risk-benefit and cost-benefit analysis.

g. ANALYSIS OF MILITARY OPERATIONS (ESR #7): The graduate will have significant exposure to and be able to model and analyze military operations using operations analysis techniques to support concept development, tactics, and operations.

h. PRACTICE (ESR #8): The graduate will have gained experience working in all aspects of an analytical study and will demonstrate the ability to conduct independent analytical studies including a thesis and demonstrate proficiency in presenting the results both orally and in writing.

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2022 Educational Skill Requirements
Operational Warfare Analysis (OWA)
Subspecialty 3211
Curriculum 355

1. Curriculum Number: 355

2. Curriculum taught at Naval Postgraduate School.

3. Students are fully funded.

4. Curriculum Length in Months: 18 months

5. Academic Profile Code Required: 335

6. The officer must understand the fundamental concepts and be familiar with the basic functional areas of Operational Warfare Analysis (OWA) within the Department of Navy (DoN) and the Department of Defense (DoD) including the following ESRs:

   a. BASIC (ESR #1): The graduate will possess the mathematical and advanced computer programming skills required to support graduate study in operations research and have the ability to use computers to aid in analysis.

   b. UNCERTAINTY AND DATA ANALYTICS (ESR #2): The graduate will be well versed in uncertainty fundamentals for systems analysis, including applications of probability, statistics, data analysis, modeling uncertainty and specialized models in advanced data analysis and statistical and machine learning.

   c. SIMULATION (ESR #3): The graduate will be able to construct and utilize Monte Carlo simulations of combat and other processes that evolve in time, will be able to deal with statistical issues associated with the need for replication; and be able to use advanced methods of simulation outcome analysis.

   d. TACTICAL ANALYSIS (ESR #4): The graduate will be able to apply operations analysis methods to tactical and operational problems including tactical decision analysis.

   e. COST ANALYSIS (ESR #5): The graduate will understand the methods and practice of cost analysis including various cost models, with particular emphasis in the relationship of effectiveness models and measures to cost, and applications in cost-benefit analysis.

   f. RISK-BENEFIT ANALYSIS (ESR #6): The graduate will be able to apply the principles of probabilistic risk assessment in the context of systems analysis decision problems. This includes a framework for balancing risks and benefits, and analysis under conditions of large financial and technological uncertainties.

   g. OPTIMIZATION (ESR #7): The graduate will be able to formulate and solve a wide variety of optimization problems with particular emphasis on applications in optimum allocation of scarce resources, multi-year capital budgeting, and network analysis.

   h. PRACTICE (ESR #8): The graduate will have gained experience in all aspects of analytical studies, including review and critique the work of others, as well as participation in the conduct of an analytical study. Review and critique to include the ability to highlight critical assumptions, recognize strengths and weaknesses of applied analytical methodologies, and evaluate study recommendations. Practice in the design and conduct of an analytical study

includes the skills to formulate problems, use the analytical process to define study requirements, and apply appropriate analytical methodologies. Practice also includes demonstrating proficiency in presenting results both orally and in writing.
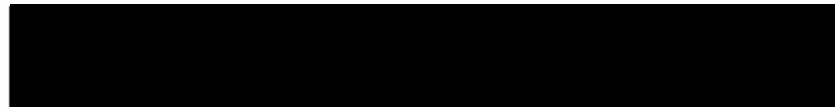
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