

Military Operations Research Program

**School of Information Technology and
Engineering
George Mason University**

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Philosophy of the MOR Program

- **Few educational opportunities exist outside the Government in the area of Military Operations Research – program is appropriate for both military personnel and civilians**
- **Military Operations Research is just an application area of OR – a solid grounding in the basics of OR is needed for the student to become an effective military analyst**
- **Student should attain familiarization with the major classes of problems encountered by Military OR Analysts - Learn how OR techniques are applied in a military context**
- **Student should experience solving realistic smaller scale problems that Military OR Analysts must regularly solve in course work and projects**
- **A close relationship must be maintained with Military OR activities in the National Capital Region to ensure continued relevance of the program content**

Requirements for Admission

- **Fulfill all admission requirements for graduate study, including 3 letters of recommendation**
- **Undergraduate degree in a related field:**
 - **Mathematics**
 - **Engineering**
 - **Computer Science**
 - **Etc.**
- **Mathematics courses:**
 - **Calculus I , II, III and Differential Equations**
 - **Linear Algebra**
 - **Probability and Statistics (2 courses)**
- **Knowledge of at least one scientific computing language**

Requirements for Master's Degree in MOR

At least 30 credits of coursework divided as follows:

– Required Courses:

- **OR 541 Operations Research: Deterministic Models**
- **OR 542 Operations Research: Stochastic Models**
- **OR 635 Discrete System Simulation**
- **OR 651 Military Operations Research I: Cost Analysis**
- **OR 652 Military Operations Research II: Effectiveness Analysis**
- **OR 680 Applications Seminar**

– Four elective courses which may include:

- **SYST 683 Modeling Simulation and Gaming**
- **OR 649 Systems Analysis of Peacekeeping Operations**
- **Other OR courses in optimization, stochastic models, statistics, and decision analysis**

Graduate Certificate Program in Military OR

- **Requirements for admission same as for Master of Science program**
- **Program is right for:**
 - **Students that already have a quantitative graduate degree that want concentrated study in MOR**
 - **Students who do not have time to complete an entire MS program, but want to attain knowledge in MOR**
- **Course requirements (6 courses for 18 credits)**
 - **OR 541 Operations Research: Deterministic Models**
 - **OR 542 Operations Research: Stochastic Models**
 - **OR 635 Discrete System Simulation**
 - **OR 651 Military Operations Research I: Cost Analysis**
 - **OR 652 Military Operations Research II: Effectiveness Analysis**
 - **SYST 683 Modeling Simulation and Gaming**

Military Operations Research
Recent Projects and Theses

- **U.S. Coast Guard Optimizes Cutter Upgrade Scheduling – LCDR James Passerelli, USCG**
- **Optimal Placement of Unattended Ground Sensors for the Future Combat System (PhD Dissertation) – LTC Steve Charbonneau, U.S. Army**
- **Non-cooperative Target Interdiction Campaign Enhancement in the Amazon (Masters Thesis) – MAJ Glaucio Mancini, Brazilian AF**
- **Optimal Allocation of Coast Guard HH-60J Spare Parts – LCDR Kevin Gavin, USCG**
- **Route Optimization for Soldiers in Clearing Operation – Matt Olson, SAIC**
- **Optimization of Second Destination Transportation in the US Army – Ben Schull, SAIC**

Goal of the Military OR Program

- **Produce knowledgeable OR analysts that have familiarity with how OR is applied to Military problems**
- **Maintain close ties with the military analytic community**
- **Perform research on pressing problems of Military OR**

Backups

Detailed Descriptions of Military OR Courses

OR 651 Military Operations Research I – Cost Analysis

- Comprehensive treatment of Defense Cost Analysis**
- Extremely important topic in the support of defense decision-making at National level – thus required of all MOR students**
- Offered off campus at the facilities of the Institutes for Defense Analyses**
- Different expert lecturer each week**

Detailed Descriptions of Military OR Courses

(continued)

OR 651 Military Operations Research I – Cost Analysis

– **Topics covered include:**

- **Economics in Cost Analysis**
- **Cost Data collection**
- **Estimating Relationships**
- **Learning or Progress Curves**
- **Software costing**
- **Force costing**
- **Acquisition schedule estimation**
- **Life-Cycle Costing**

– **A Cost Analysis Project is required**

Detailed Descriptions of Military OR Courses

(continued)

OR 652 Military Operations Research II: Effectiveness

Analysis

- **Focus on issues for National Level military analysis**
- **Examination of models and techniques presently in use in the military analysis community**
- **Guest speakers from the local analytical community**
- **Realistic case studies based on actual problems encountered by military analysts within the last few years**

Detailed Descriptions of Military OR Courses

(continued)

- **OR 652 Military Operations Research II: Effectiveness Analysis**
 - **Topics covered include:**
 - **Theater Campaign Analysis**
 - **Equipment Modernization**
 - **Force Structure**
 - **Strategic Mobility and Deployment**
 - **Small Scale Contingencies**
 - **Decision Analysis for Military Problems**
 - **Logistics and Requirements**
 - **Realistic problem from defense analysis addressed in a group project in this course**

Detailed Descriptions of Military OR Courses

(continued)

SYST 683 Models, Gaming, and Simulation

- **Concentrates on the design and use of combat simulation models as aids to defense decision making**
- **Students will understand techniques for representing acquisition, attrition, movement, battlefield environment, command and control, communications, intelligence, air-to-air combat, and decision making**
- **Discussion of advanced modeling techniques (e.g., object-oriented programming, advanced distributed simulation, High-Level Architecture)**
- **A Project is required in this course**

Detailed Descriptions of Military OR Courses

(continued)

OR 649 Systems Analysis for Peace Operations

- Emphasizes differences between “standard” military OR and analysis of Peace Keeping and other Operations Other than War**
- Provides a structure for analyzing Peace Keeping Operations based on significant research performed at GMU in the area**
- Examines various techniques for performing this analysis**
 - Decision/Game Theoretic methods**
 - Bayesian and Belief networks**
 - System Dynamics**
 - Others**
- Group project required**