

**Industry and Government Sponsorship  
of Final Projects  
Masters in Systems Engineering  
Masters in Operations Research**

**Background:**

The Master's Program Final Project courses OR 699 and SYST 699 serve as the synthesis activity for students completing a masters degree in Operations Research (OR 699) or Systems Engineering (SYST 699). Student will complete a major applied and realistic project in their field. Work is done in student teams of three or four students. Depending on the nature of the problem, the teams are comprised of a combination of operations researchers and systems engineers in the proportions appropriate to the problem at hand. The students prepare a comprehensive final report to the study sponsor, as well as a briefing to the sponsor and the entire SEOR department faculty. Students also prepare a website that describes the problem, the solution approach, the results, and serves as a repository for all written submissions. Regular in-class progress review sessions in which students report their progress are held. In addition, there are team meetings with the course professor. If a certain domain expertise within operations research or systems engineering is required, the students may also meet to consult with the domain expert faculty within the SEOR Department.

**Purpose of the Final Project Course:**

The project course provides the students with the opportunity to put all of the course material that they have covered in their graduate curriculum into practice. It also provides the faculty with the opportunity to test the students' ability to have assimilated the course material and certify that they are ready to receive their Master's degree. Students use their acquired skills to solve real-life, unstructured, complex problem, interact with stakeholders, define the problem, provide alternatives, perform analysis, make recommendations and present their results in briefings and a written report, as well as a project web site. At the point of capstone project initiation, the students should have the basic skills to allow them to create new systems that are technically sound, affordable, environmentally compatible and safe.

**Properties of a Good Industry- or Government-Sponsored Design Problem:**

A good problem for a project is one which is stated as a specific customer need with a general amount of information that supports and explains the nature of the customer's need. The student team must use systems engineering and/or operations research processes to structure the need into a formal statement of need that is possible to address within the time and resources available to the design effort. Defining the project scope and formulating the problem is an important part of the project experience. The customers must have a designated point-of-contact or a Contracting Officer's Technical Representative available to the student design team for technical consultation.

A good project will have a real problem with interested and active customer involvement. A good project will be data-rich and loosely defined, to allow the student teams to exercise statistical data analysis and problem formulation/design creativity. A good project will address a real-life, unstructured, complex problem, that will typically need to be scoped down by the students so that it is still difficult but doable within the 14 weeks allotted for the effort. The problems should ideally be submitted to the SEOR Dept. at least 6 weeks before the semester in which preceding the project activity.

Projects should not involve classified or company proprietary data and should be presentable and publishable in professional journals and competitions.

**Sample Senior Design Projects:**

The titles of recent projects are found at <http://seor.gmu.edu/projects/grad-proj.html>.

Sample titles of recent projects include:

- Air Traffic Controller Cyber Attack Evaluation Serious Game
- Economic Impact Tool for the Center for Army Analysis
- A Network Model to Simulate Airport Surface Operations
- Design of a Weather-Normalization Forecasting Model for NOVEC
- Application of Fat Tailed Models in Financial Markets
- Big Data Analytics on Mobile Usage
- Testing to Improve User Response of Crowdsourced S&T Forecasting System
- Ubiquitous CBRNE Sensor Networks: An Analysis of Parameters
- Assessment of Migrating NOVEC's Core Applications to Cloud
- Dynamic Routing Prototype for the United States Postal Service (USPS)
- The Washington Post Scheduling Project

The full student reports, presentation of the can also be found at this site.

**Cost for a Project Sponsor to Participate:**

Sponsors are asked to provide a tax free donation to the SEOR fund. This donation is typically made as a donation to the SEOR in a single installment at the end of the Spring Semester. In the unlikely event that the student work does not meet the faculty or sponsor's expectation we will waive the donation. All published work will acknowledge the sponsor's financial and technical support.