The Systems Engineering and Operations Research (SEOR) Department offers a bachelor’s degree in systems engineering, a minor in systems engineering and operations research, a minor in aviation flight training and management, a master’s degree in systems engineering, a master’s degree in operations research, and a doctoral degree in systems engineering and operations research. The department also offers a concentration in predictive analytics within a school-wide Data Analytics Engineering, MS. In addition, the department offers six certificate programs at the master’s level: architecture-based systems integration; command, control, communications, computing, and intelligence (C4I); military operations research; computational modeling; financial systems engineering and systems engineering of software-intensive systems. The Department also offers a dual degree MS in Operations Research and Statistical Science jointly with the Statistics Department.

There is much overlap between systems engineering and operations research. The department encourages students of either discipline to elect courses in the other. For more information, go to the department’s website (http://seor.gmu.edu).

Systems Engineering
Systems engineers determine the most effective ways to use all of a system’s components: people, machines, materials, information, and energy. The engineers plan, design, implement, and manage integrated systems, working to ensure performance, safety, reliability, and maintainability. They also work to ensure that systems are delivered on time at a reasonable cost. Examples of systems are computer networks, the national airspace system, automobiles, intelligent robots, the electric grid, the Metro, and Mason. Whereas other engineering disciplines concentrate on individual aspects of a system, such as electronics, ergonomics, or software, systems engineers focus on the system as a whole. Systems engineering, perhaps more than any other engineering discipline, is involved with the human and organizational aspects of developing the desired system. Systems engineering is the people-oriented engineering profession.

Operations Research
Operations research is the professional field that uses analytical methods in engineering to support management decision making, often focusing on how best to allocate limited resources. Operations researchers do for organizations what physicists do for the physical world: they try to find order in apparent chaos by identifying the structure in complex situations and understanding how the components of organizations interact. The goal is to explain and predict the effects of actions taken on these systems, and use the information to make informed decisions. Much of this work is developing and manipulating mathematical and computer models of organizational systems composed of people, machines, information, procedures, and frequently, big data. The overall purpose is to provide a rational basis for decision-making.