



# SPSM - Space Systems | Grad

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TDMA, FDMA and other access schemes. This course presents an in-depth analysis of current and future trends in satellite communication systems development and technologies such as Laser, Satellite-to-Satellite, Direct Broadcast, Global Cellular and WiFi support.

## **SPSM 5730 Space Operations Research (3)**

Students examine modeling techniques that assist in the decision-making process of space operations. Linear, nonlinear, integer, and dynamic programming techniques applicable to space operations are among the deterministic mathematical methods explored.

## **SPSM 5740 Space Systems Orbital Mechanics (3)**

Students examine the basic application of orbital maneuvers, ground traces, ballistic trajectories, mathematics associated with the solution of the two- or three-body problem, satellite stability and attitude control, and boost/re-entry dynamics and attitude control. The theory of basic navigation guidance and control, the dynamics of interplanetary travel, and the effects of space environment and debris are explored.

## **SPSM 5750 Space Systems Engineering (3)**

Students examine a wide range of engineering issues and consider factors that affect spacecraft design. Topics include human factors engineering, logistics support, long-duration low-Earth and deep space operations, design trade-offs, risk identification, and mitigation techniques. Use of tele-robotics and interactive virtual environmental support systems, computer-based modeling and simulation tools, and other current engineering considerations are studied.

## **SPSM 5760 Space Bio-Astronautics (3)**

Students examine the broad range of environmental stresses on the human element for short- and long-duration space travel, including psychological and physiological effects. Pressure, temperature, G-forces, and radiation are among the specific stresses considered. The extension of space operations and human survivability and considerations that affect spacecraft and spacesuit designs, are studied. Consumables such as food, water, breathable air, and fuel are addressed with respect to manned space travel.

## **SPSM 5770 Space Operations Management (3)**

Students examine various operations issues such as launch facilities, Space Vehicle design and development, ground control infrastructure, and end user support operations. Manning, technical support, outsourcing and other issues impacting operations management are included. The International Space Station (ISS) may be used as a potential course topic for examining large-scale low-Earth operations. Long-term projects such as lunar and Mars missions are potential projects for research.

## **SPSM 5800 GPS Space Radio Navigation Systems (3)**

This course focuses primarily on the Global Positioning System (GPS) and gives the student hands-on experience with a space-based radio navigation system. This course examines current and future GPS applications. Students will explore basic navigation, map coordinate systems, and then integrate this knowledge by understanding the GPS satellite navigation signal properties, capabilities and limitations. Differential GPS and Continuous Broadcast Service will be addressed. Additional information on

other radio navigation systems may be included. **This course may not be used to substitute for SPSM 5340.**

## **SPSM 5900 Space Commercialization (3)**

Students examine the early development of space operations from the first rocket and satellite launches; U.S. and international policies and their effect on space operations; orbit topologies and the impact they have on the space, ground and user segments. Current initiatives in the commercialization of space including: launch services; the NASA technology transfer programs; satellite communications - voice and data services, direct broadcast TV; remote sensing; radio navigation; mining, manufacturing and tourism. Examination of commercial space services, spaceports and the assessment of business risks associated with new start-ups and competing terrestrial services is integral. Included will be a review of the U.S. International Traffic in Arms Regulation (ITAR) and Export Administration Regulation (EAR) and the impact they have on U.S. space business competitiveness. Investments and incentives for commercial development of new space business ventures, as well as legal issues with areas such

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## **SPSM 5950 Space Systems Project Management (3)**

Students examine those processes used by space system managers to engage and communicate with stake holders, plan, organize, coordinate, and direct the efforts of functional staff, other technical, and project groups in accomplishing the objectives of space system programs and projects. Project cost and personal work estimating are included. Relevant aspects of the Program Management Institute (PMI®), Program Management Book of Knowledge (PMBOK®) may be addressed.

## **SPSM 5990 Issues in Space Operations (3)**

Current, timely and significant issues in space operations are