Advanced Infrastructure Systems (AIS)

The AIS education and research area focuses on the application and exploration of emerging Information and Communication Technologies (ICT) to improve the design, construction and operations of infrastructure systems including:

- Buildings and other facilities
- Transportation infrastructure
- Telecommunications networks
- Environmental systems and
- The electric power grid

MS Concentrations in Advanced Infrastructure Systems

Advanced Infrastructure Systems Technology Development and Applications

This AIS concentration provides the tools to develop new technologies that can improve the sustainability, efficiency, maintainability, durability and overall performance of infrastructure systems. Graduates will be able to perform data-driven decision-making, and will develop the ability to design and evaluate systems for intelligent behavior in an infrastructure-oriented domain.

IT-Based Sustainable Global Infrastructure and Construction Management

With consideration of the global nature of modern projects and the growing need for sustainable practices, this MS concentration prepares students for a career in construction management assisted by advanced information and communication technologies. Graduates are able to leverage emerging Information and Communications Technologies (ICT) to manage more efficiently and effectively infrastructure systems and their associated processes; to perform data-driven decision-making; to design and evaluate systems for intelligent behavior in an infrastructure-oriented domain.
Recommended Courses
The following courses are recommended for the AIS concentrations, but the MS program is flexible and students should work with their academic advisors to tailor coursework towards their own individual interests and career goals.

- 12-740 Data Acquisition
- 12-741 Data Management
- 12-746 Special Topics: Python Prototyping for Infrastructure Systems
- 12-743 Computer-based Approaches for Search and Decision Support in Civil Infrastructure
- 12-745 AIS Project
- 12-711 Building Information Models and IT-based Analysis for Construction Project Management

Additional Courses
The following crosscutting courses relate to these concentrations and may be of interest for additional course work, depending on individual student goals.

AIS Technology Development and Applications

- 10-605 Machine Learning with Large Datasets
- 10-708 Probabilistic Graphical Models
- 15-381 Artificial Intelligence: Representation and Problem Solving
- 15-781 Machine Learning
- 16-385 Computer Vision
- 16-722 Sensing and Sensors
- 18-290 Signals and Systems
- 18-510 Sensor Systems Design
- 18-618 Smart Grids and the Future of Electric Systems
- 18-748 Wireless Sensor Networks
- 95-791 Data Mining

IT-Based Sustainable Global Infrastructure and Construction Management

- 12-411 Project Management for Construction
- 12-610 Special Topics: ICCM: International Collaborative Construction Management
- 12-704 Probability and Estimation Methods for Engineering Systems
- 12-706 Civil Systems Investment Planning and Pricing
- 12-712 Introduction to Sustainable Engineering
- 12-747 Sustainable Buildings
- 12-748 Mechanical and Electrical System Design for Buildings
- 12-750 Infrastructure Management

For a full listing of available courses and their descriptions, visit the Course Catalog in the HUB (cmu.edu/hub)