INFRASTRUCTURE SYSTEMS ENGINEERING – ISE

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<td>CE 5020 Introduction to GIS</td>
<td>3 CE 5000 Management of Large Scale Projects</td>
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<td>CE XXXX ISE Core (1)</td>
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<td>Technical Elective (3)</td>
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(1) IS Core – Students must select four courses from the following lists or as approved by the student’s advisor. To ensure suitable breadth, students must take at least one course from each group.

**Group A – Geotechnical, Environmental, and Water Resources Engineering**

- CE 5240 Groundwater Hydrology and Contaminant Transport
- CE 5700 Foundations
- CE 6130 Advanced Geotechnical Engineering
- CE 6220 Water Chemistry
- CE 6230 Hydrology
- CE 6260 Environmental Microbiology and Biological Waste Treatment
- SYS 6070 Environmental Systems Processes (not approved for students with a BS in CE)

**Group B – Transportation Engineering**

- CE 5400 Traffic Operations
- CE 6410 Introduction to Transportation Planning
- CE 6420 Public Transportation
- CE 6430 Intermodal Transportation
- CE 6440 Intelligent Transportation Systems
- CE 6450 Transportation Safety Design
- CE 6470 Transportation Economics

(2) Systems, Sustainability, Resilience, and Risk (SSRR) electives – students must complete two courses from the following list:

- ARCH 5150 Global Sustainability
- CE 5500 GIS Resilience
- CE 6009 The Art and Science of Systems Modeling
- CE 6030 Green Engineering
- CE 6250 Environmental Systems Modeling and Management
- CE 6490 Transportation Data Analysis and Modeling
- CE 6460 Introduction to Integrated Transportation Systems Models
- CE 6500 Hydroinformatics
- PLAN 5453 Healthy Cities
- PLAN 5810 Sustainable Communities
- SYS 6001 Introduction to Systems Analysis & Design
- SYS 6050 Risk Analysis

Updated: April 2018
(3) Technical electives may include any technical course at or above the 5xxx level approved by the academic adviser. One elective may constitute research or a professional internship (i.e., CE 6995 - refer to the CE website for details).

(4) Pre-requisites: college calculus through Ordinary Differential Equations, college physics, and college chemistry; plus, Introduction to Environmental Engineering (CE 2100 or equivalent), Introduction to Geotechnical Engineering (CE 3710 or equivalent), and Transportation Infrastructure Design (CE 3400 or equivalent).

(5) Students may be permitted to modify this framework, pending approval of their academic advisor and the CE Director of Graduate Studies. Additionally, online courses from Virginia’s CGEP program may be suitable to meet the requirements for this degree. See cgep.virginia.gov/courses for current course offerings.