

SMART CITIES MINOR

College of Engineering

Program Website (<https://www.engineering.cornell.edu/cee/degree/smart-cities-minor-requirements/>)

Program Description

The Smart Cities minor recognizes the growing ubiquity of sensors, smart devices, real-time data and advancements in artificial intelligence in the fields of civil and environmental engineering to approach the built and natural environments. This minor encourages engineering students to learn about how to best use data to design, analyze, and control smart, interconnected, and dynamic infrastructure systems. To help engineer smart cities of the future, in addition to technical skills in civil engineering students in this minor will also gain knowledge on the environment, climate change, technology, sensors, and data science.

Minor Requirements

A minimum of six (6) courses (18 credits), at least nine (9) credits of which must be unique from Required Major Courses used to satisfy the student's major.

Core Requirements

Code	Title	Hours
Select at least two of the following:		
ORIE 2380		3
CEE 4665	Modeling and Optimization for Smart Infrastructure Systems	3
CEE 4795	Sensors for the Built and Natural Environments	3
CEE 4800	Engineering Smart Cities	3
CEE 4930	Data Analytics	4
CEE 5735	Mathematical Modeling of Natural and Engineered Systems	3
CEE 5745	Inverse Problems: Theory and Applications	3

Focus Areas

Remaining credits can be bundled into focus areas. Examples of areas and courses are given below; students can petition other areas and relevant courses:

Transportation & Energy Systems

Code	Title	Hours
CEE 3610	Introduction to Transportation Engineering	3
CEE 4210	Renewable Energy Systems	3
CEE 4620	Analysis and Control of Transportation Systems and Networks	3
CEE 4640	Sustainable Transportation Systems Design	3
CEE 4880	Applied Modeling and Simulation for Renewable Energy Systems	3
ENMG 5200	Economics of the Energy Transition	3
MAE 4220	Introduction to Internet of Things - Technology and Engagement	3

Climate-Energy-Water Nexus

Code	Title	Hours
BEE 4310	Environmental Statistics and Learning	4
CEE 4200	Managing Water Resources in a Changing World	3
CEE 4565	Waste Water Processes and Resources Recovery	3
CEE 5420	Energy Technologies and Subsurface Resources	3

Finance, Economics, and Infrastructure Policy

Code	Title	Hours
CEE 3230	Engineering Economics and Management	3
ENMG 5200	Economics of the Energy Transition	3
ENMG 5940	Economics and Finance for Engineering Management	4
INFO 5455	Smart Cities: Requirements, Ambitions, and Limitations	3
PUBPOL 5755	Infrastructure Financing	3
PUBPOL 5757	Infrastructure Project Management and Finance Practicum	1.5
PUBPOL 4640	Regulation and Infrastructure Policy	3

Engineering students affiliated with all majors except Civil Engineering are eligible to participate in this minor. Civil Engineering students can choose to follow the Smart Cities concentration.

Graduation Requirements for Engineering Minor Degree Programs

Requirements

Students may pursue minors in any department in any college that offers them, subject to limitations placed by the department offering the minor or by the students' major. Completed minors will appear on the student's transcript. Not all departments offer minors. Additional information on specific minors can be found above, in the *Engineering Undergraduate Handbook*, in the undergraduate major office of the department or school offering the minor, and in Engineering Advising.

An engineering minor recognizes formal study of a particular subject area in engineering normally outside the major. Students undertaking a minor are expected to complete the requirements during the time of their continuous undergraduate enrollment at Cornell. Completing the requirements for an engineering minor (along with a major) may require more than the traditional eight semesters at Cornell. However, courses that fulfill minor requirements may also satisfy other degree requirements (e.g., distribution courses, advisor-approved, or major-approved electives), and completion within eight semesters is possible.

An engineering minor requires:

- successful completion of all requirements for an undergraduate degree.
- enrollment in a major that approves participation in the minor.
- satisfactory completion of six courses (at least 18 credits) in a college-approved minor.

Students may apply for certification of a minor at any time after the required course work has been completed in accordance with published standards. An official notation of certification of a minor appears on the Cornell transcript following graduation.