# CI9.S.1.3 Data Networks in Advanced M&E systems

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| Term: | Spring |
| Contact hours: | 25 |

## 1.0 Aims

As an introduction to the subject of monitoring large scale civil engineering infrastructure and environmental systems, this module aims to familiarise students with the principles of instrumentation and monitoring, including planning, sensor selection, data acquisition, information management and error analysis in engineering projects.

## 2.0 Syllabus

* Fundamental concepts in sampling theory, statistical sampling, data management and uncertainty analysis of measured data.
* Integration of modeling, monitoring and control in the design and operation of civil engineering infrastructure and environmental systems.
* Planning and executing a monitoring programme.

## 3.0 Intended learning outcomes

On successfully completing this course unit, students will be able to design an instrumentation programme for monitoring the performance of the built and natural environments, understand the fundamentals of various sensing and monitoring technologies and confidently apply the material to which they have been exposed. The students will also acquire an appreciation of the importance of integrating modelling, monitoring and control in the design and operation of engineering infrastructures. More specifically, the course will provide the students with:

* Familiarity with data network systems
* Awareness of the various technologies for sensing and structural health monitoring of engineering infrastructure.
* The ability to apply design criteria to determine the optimal monitoring technology and strategy for particular types of engineering infrastructure.
* An understanding of the sensing requirements with respect to temporal and spatial resolution, accuracy and sensitivity
* The ability to apply fundamental concepts in sampling theory (Nyquist–Shannon sampling theorem, digital signal processing (DSP), statistical sampling, Fourier sampling), data management and error analysis of the measured data in the design of a data acquisition programme.

## 4.0 Assessment

* There is one piece of Coursework associated with this module worth 5%. This needs to be completed successfully in order to complete this module.
* Progress tests in the form of group work.

## 5.0 Recommended textbooks

Category as defined by Central Library:

C = Core, S = Supplementary

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| S | Gelenbe, E & Mitrani, I. (2010) *Analysis And Synthesis of Computer Systems,* 2nd Ed., London, World Scientific Publishing Co. Pte. Ltd. |