B31XM Information Theory and Communications

**COURSE DETAILS**

**Course Code:** B31XM  
**Full Course Title:** Information Theory and Communications  
**SCQF Level:** 11  
**SCAF Credits:** 15  
**Available as Elective:** No

**DELIVERY LEVEL**

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<th>Undergraduate:</th>
<th>No</th>
<th>Postgraduate Taught:</th>
<th>Yes</th>
<th>Postgraduate Research:</th>
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*Additional Information:*

**COURSE AIMS**

To develop a knowledge of advanced and important information theory concepts.

To develop a critical understanding of wireless communications, coding and its connection to data science.

To develop a critical understanding of information theory concepts for data science applications.

**LEARNING OUTCOMES – SUBJECT MASTERY**

Critical understanding of advanced information theory concepts applied to communications and data science.

Practical knowledge of advantages and limitations of techniques to accompany detailed theoretical knowledge.

Knowledge of current research in application of information theory to data science and communications.

**LEARNING OUTCOMES – PERSONAL ABILITIES**

Ability to critically review, evaluate and implement a range of advanced techniques in information theory, communications and data science.

**SYLLABUS**
1. Fundamentals of Information Theory and Communications

*Introduction, Probability, Entropy, and Inference
*Data Compression and Source Coding
*Data Communication Noisy-Channel Coding

*Error-Correcting Codes

2. Information Theory in Data Science

*Hypothesis Testing

*Fano’s Inequality

*Concentration of measure and large deviations theory

3. Applications of information theory to data science and to various emerging communications problems

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<th>COURSE RELATIONSHIPS</th>
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<th>LOCATION AND ASSESSMENT METHODS</th>
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