Course Content

Course Title (English)	Network Information Theory
Course Title (Chinese)	網路消息理論
Credit	3
Instructor	Prof. I-Hsiang Wang 王奕翔 教授
Outline	1. Measures of Information: entropy, differential entropy, mutual information, typical sequences. 2. Point-to-Point Communication: channel coding theorem, polar coding, lossless and lossy source coding, source-channel separation, Gaussian channel. 3. Channel with States: compound channel, channel with random state, dirty-paper coding, fading channel capacity. 4. Multiple Access Channel (MAC): successive interference cancellation, time-sharing, joint decoding, capacity of MAC. 5. Broadcast Channel (BC): superposition coding, capacity of degraded BC, Marton's coding scheme, capacity of deterministic BC, MIMO Gaussian BC. 6. Interference Channel (IC): Han-Kobayashi coding scheme, capacity of Gaussian IC to within 1 bit, capacity of deterministic IC, interference alignment. 7. Relay Channel (RC): decode-and-forward, compress-and-forward, Gaussian relay channel, amplify-and-forward. 8. Distributed Source Coding: Slepian-Wolf theorem, Wyner-Ziv theorem. 9. Network Information Flow: Cut-set bound, network coding, noisy network coding. 10. Feedback: Schalkwijk-Kailath scheme, feedback in Gaussian IC. 11. Non-Asymptotic Information Theory

Goal	1. Introduce advanced topics in information theory, especially in network settings. 2. Expose students to research in information theory through homework and term projects.	
English Teaching	☐ YES	■ NO
Teaching Material	■ English	☐ Chinese