

الخطة الدراسية

قسم هندسة تقنيات الحاسوب / كلية الهندسة التقنية / جامعة الكفيل / العام الدراسي 2020 – 2021

المرحلة الدراسية:	الرابعة
التخصص:	شبكات اتصالات الحاسوب
اسم المادة الدراسية باللغة العربية:	نظرية المعلومات و الترميز
اسم المادة الدراسية باللغة الانجليزية:	Information Theory & Coding
اهداف المادة:	تهدف المادة الى تعريف الطالب بنظريات المعلومات وانواع الترميز والخوارزميات المستخدمة في الترميز
وصف المادة:	من المواد التخصصية تقسم المادة الى جزئين الاول تعريف الطالب بنظريات المعلومات واما الثاني فهو تعريف انواع الترميز والخوارزميات المستخدمة في الترميز
عدد الساعات النظرية:	2
عدد الساعات العملية:	2
عدد الوحدات:	6
اسم التدريسي باللغة العربية:	د. نصير قاسم حمودي الباجةجي
اسم التدريسي باللغة الانجليزية:	A. Prof. Dr. Nasseer K. Bachache
اللقب العلمي:	أستاذ مساعد
عنوان البريد الالكتروني الجامعي:	Nasseer.albachache@alkafeel.edu.iq
رقم الهاتف الجوال (WhatsApp):	009647700712567

المنهج المقرر / الجزء النظري:

Week	Syllabus
1	Review of related probability and statistics related topics.
2	Definition of random variable, definition of Alphabet, definition of joint probability.
3	Conditional probabilities and Bayes rule .Independence of two random variables .Venn's diagram.
4	Model of information transmission system. Common sense definition of information .Logarithmic measure of information. Self-information.
5	Definition of information for noisy channel .Posteriori probabilities. Average mutual information for noisy channel.
6	Shannon representation diagram of information source. Parameters of discrete channel.
7	Average information (entropy) of a discrete and continuous source, maximum source entropy. Source efficiency.
8	Entropy for continuous uniform distribution source. Entropy for continuous Gaussian distribution source.
9	Entropy for continuous Triangular distribution source. Entropy for continuous Exponential distribution source.
10	Transition probability matrix of channel, discrete noiseless and noisy channel models, uniform channel. Ternary symmetric channel.
11	Information transmission over symmetric channel, noiseless channel, binary symmetric channel, ternary symmetric channel.
12	Memory and memory less information channels .Binary Erasure channel(BEC).
13	Capacity of discrete channel, channel capacity for noiseless channel. Channel efficiency and redundancy. Channel capacity for symmetric channels.
14	Capacity of discrete channel, channel capacity for noiseless channel. Channel efficiency and redundancy. Channel capacity for symmetric channels.
15	Channel capacity for nonsymmetrical channels .binary nonsymmetrical channel.
16	Mutual information of continuous channel. Capacity of continuous channels. Efficiency and redundancy of continuous channel.
17	Sampling of continuous source .Sampling Theorem. Nyquist theorem for transmission over band limited continuous channel. Shannon-Hartly channel capacity theorem.
18	Sampling of continuous source .Sampling Theorem. Nyquist theorem for transmission over band limited continuous channel. Shannon-Hartly channel capacity theorem.
19	Cascaded information channels .Parallel information channels.
20	Source encoding; fixed and variable length codes. Prefix property .Average length of source code. Source code efficiency and redundancy.
21	Fano coding method.
22	Shannon – Fano coding method.
23	Huffman Coding. Hamming distance.
24	Channel Coding in Digital Communication Systems. Forward Error Correction (FEC)
25	Block codes. Cyclic Redundancy Check (CRC)
26	Repetition Codes, Single Parity Check Codes.

27	Why do we need to compress? . Data compression basics. Lossless Compression. Run-Length Encoding (RLE)
28	Principles of example of Coding Methods used in file and image compression .ZIP .JPEG
29	Speech coding and compression techniques overview (LPC block diagram). Delta modulation. Vocoder Principle. Performance measuring.
30	Speech coding and compression techniques overview (LPC block diagram). Delta modulation. Vocoder Principle. Performance measuring.

المنهج المقرر / الجزء العملي:

Week	Syllabus
1	Block codes. Cyclic Redundancy Check (CRC)
2	Block codes. Cyclic Redundancy Check (CRC)
3	Why do we need to compress? . Data compression basics. Lossless Compression. Run-Length Encoding (RLE)
4	Why do we need to compress? . Data compression basics. Lossless Compression. Run-Length Encoding (RLE)
5	Speech coding and compression techniques overview (LPC block diagram). Delta modulation. Vocoder Principle. Performance measuring.
6	Speech coding and compression techniques overview (LPC block diagram). Delta modulation. Vocoder Principle. Performance measuring.
7	Capacity of discrete channel, channel capacity for noiseless channel.
8	Channel efficiency and redundancy.
9	Channel capacity for symmetric channels.
10	Entropy for continuous distribution source.
11	Average information (entropy) of a discrete and continuous source
12	Maximum source entropy. Source efficiency.
13	Entropy for continuous uniform distribution source.
14	Entropy for continuous Gaussian distribution source.
15	Shannon representation diagram of information source.

المصادر:

المراجع الرئيسية:

[1] Todd K. Moon ‘Error Correction Coding Mathematical Methods and Algorithm’

المراجع المساعدة:

[1] Fazlollah M. Reza “ An introduction to information theory ”