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| Course Instructor | Nuha jameel ibrahim |
| E-mail | Nuha.j.ibrahim@uotechnology.edu.iq |
| Title | Information Theory |
| Course Coordinator | Introduction to probability theory, Introduction to information theory, Mode of the signal system, Some code: ASCII CODE & MORSE CODE, The measure of information, Self-information, Average information (Entropy), Maximum Entropy for Discrete Source, Binary source, Ternary Source, Information Rate, Mutual information, Normal noisy channel. |
| Course Objective | 1.    Understanding the fundamental concepts: The module aims to provide students with a solid understanding of the basic concepts and principles of information theory. This includes topics such as entropy, information content, coding theory, and data compression.

2.    Mathematical foundations: Information theory is built upon mathematical principles, particularly probability theory and statistics. The module aims to develop students' mathematical skills and provide them with the necessary tools to analyze and solve problems in information theory.

3.    Communication systems: Information theory is closely related to the field of communication systems. The module aims to explore how information is transmitted, encoded, and decoded in various communication systems, including digital and analog systems.

4.    Applications and practical implications: Information theory has numerous applications in various fields, including telecommunications, computer science, data analysis, and cryptography. The module aims to highlight these applications and help students understand the practical implications of information theory in real-world scenarios.

5. Analytical and critical thinking: Information theory involves analyzing |

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| | and quantifying information and data. The module aims to enhance students' analytical and critical thinking skills, enabling them to evaluate information sources, make informed decisions, and solve problems effectively. |
| Course Description | 1. Understand the fundamental concepts of information theory, including entropy, information content, and channel capacity. |
| | 2. Apply mathematical methods to analyze and quantify information in various domains, such as data compression, data transmission, and cryptography. |
| | 3. Evaluate and compare different coding schemes and compression algorithms based on their efficiency and performance. |
| | 4. Design and implement error-correcting codes for reliable data transmission and storage. |
| | 5. Analyze the trade-offs between data compression and data loss, and make informed decisions in practical applications. |
| | 6. Apply information theory principles to analyze and optimize communication systems, such as wireless networks or data transmission over noisy channels. |
| | 7. Critically assess the impact of information theory on other fields, such as computer science, telecommunications, and data science. |
| Textbook | 1. Information Theory: A Tutorial Introduction by James Stone (Author), 2015, Sebtel Press. <br> 2. Information Theory, Inference and Learning Algorithms by David J. C. MacKay, vid J. C. MacKay, David J. C. Mac Kay (Authors), Cambridge University Press, 2003. |

| Course Assessments | Term Tests | Laboratory | Mid exam | Project | Final Exam |
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| | (35%) | | (15%) | | (50%) |
| General Notes | | | | | |

جمهورية العراق

وزارة التعليم العالي والبحث العلمي

جهاز الاشراف والتقويم العلمي

بسم الله الرحمن الرحيم

وزارة التعليم العالي والبحث العلمي
Ministry of Higher Education & Scientific Research

اسم الجامعة: التكنولوجية
اسم الكلية: علوم الحاسوب
اسم القسم: علوم الحاسوب
المرحلة: الاولى
اسم المحاضر الثلاثي:د.نهى جميل ابراهيم
اللقب العلمي: استاذ مساعد
المؤهل العلمي: دكتوراه
مكان العمل: علوم الحاسوب

# استمارة انجاز الخطة التدريسية للمادة

| الاسم | **د. نهى جميل ابراهيم** |
|---|---|
| البريد الالكتروني | Nuha.j.ibrahim@uotechnology.edu.iq |
| اسم المادة | **نظرية المعلومات** |
| مقرر الفصل | Introduction to probability theory, Introduction to information theory, Mode of the signal system, Some code: ASCII CODE & MORSE CODE, The measure of information, Self-information, Average information (Entropy), Maximum Entropy for Discrete Source, Binary source, Ternary Source, Information Rate, Mutual information, Normal noisy channel. |
| اهداف المادة | 1. Understanding the fundamental concepts: The module aims to provide students with a solid understanding of the basic concepts and principles of information theory. This includes topics such as entropy, information content, coding theory, and data compression.<br><br>2. Mathematical foundations: Information theory is built upon mathematical principles, particularly probability theory and statistics. The module aims to develop students' mathematical skills and provide them with the necessary tools to analyze and solve problems in information theory.<br><br>3. Communication systems: Information theory is closely related to the field of communication systems. The module aims to explore how information is transmitted, encoded, and decoded in various communication systems, including digital and analog systems.<br><br>4. Applications and practical implications: Information theory has numerous applications in various fields, including telecommunications, computer science, data analysis, and cryptography. The module aims to highlight these applications and help students understand the practical implications of information theory in real-world scenarios.<br><br>5. Analytical and critical thinking: Information theory involves analyzing and quantifying information and data. The module aims to enhance |

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| students' analytical and critical thinking skills, enabling them to evaluate information sources, make informed decisions, and solve problems effectively. | |
| 1.Understand the fundamental concepts of information theory, including entropy, information content, and channel capacity.<br>2. Apply mathematical methods to analyze and quantify information in various domains, such as data compression, data transmission, and cryptography.<br>3. Evaluate and compare different coding schemes and compression algorithms based on their efficiency and performance.<br>4. Design and implement error-correcting codes for reliable data transmission and storage.<br>5. Analyze the trade-offs between data compression and data loss, and make informed decisions in practical applications.<br>6. Apply information theory principles to analyze and optimize communication systems, such as wireles networks or data transmission over noisy channels.<br>7. Critically assess the impact of information theory on other fields, such as computer science, telecommunications, and data science. | التفاصيل الاساسية للمادة |
| 1. Information Theory: A Tutorial Introduction by James Stone (Author), 2015, Sebtel Press.<br>2. Information Theory, Inference and Learning Algorithms by David J. C. MacKay, vid J. C. MacKay, David J. C. Mac Kay (Authors), Cambridge University Press, 2003. | الكتب المنهجية |
| | المصادر الخارجية |

| الامتحان النهائي | المشروع | امتحان منتصف الفصل | المختبر | الفصل الدراسي | تقديرات الفصل |
|---|---|---|---|---|---|
| 50% | | 15% | | 35% | |

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| معلومات اضافية |

| جمهورية العراق | بسم الله الرحمن الرحيم | اسم الجامعة: التكنولوجية |
|---|---|---|
| وزارة التعليم العالي والبحث العلمي | | اسم الكلية: علوم الحاسوب |
| | | اسم القسم: علوم الحاسوب |
| | | المرحلة: الاولى |
| جهاز الاشراف والتقويم العلمي | | اسم المحاضر الثلاثي:د.نهى جميل ابراهيم |
| | | اللقب العلمي: استاذ مساعد |
| | | المؤهل العلمي: دكتوراه |
| | | مكان العمل: علوم الحاسوب |

## استمارة الخطة التدريسية للمادة

| الملاحظات | المادة العملية | المادة النظرية | التاريخ | الاسبوع |
|---|---|---|---|---|
| | | Principles of probability theory | 12/11/2023 | 1 |
| | | Introduction to information theory | 19/11/2023 | 2 |
| | | Mode of the signal system | 26/11/2023 | 3 |
| | | Some code: ASCII CODE & MORSE CODE | 3/12/2023 | 4 |
| | | The measure of information | 12/12/2023 | 5 |
| | | Self-information | 17/12/2023 | 6 |
| | | Mid Exam | 24/12/2023 | 7 |
| | | Average information (Entropy) | 31/12/2023 | 8 |
| | | Maximum Entropy for Discrete Source | 7/1/2024 | 9 |
| | | Binary source | 14/1/2024 | 10 |
| | | Ternary Source | 21/1/2024 | 11 |
| | | Information Rate | 28/1/2024 | 12 |
| | | Mutual information | 4/2/2024 | 13 |
| | | Normal noisy channel | 7/2/2024 | 14 |
| | | **Final Exam** | 11/2/2024 | 15 |

توقيع الاستاذ:

توقيع العميد: