ECE 7005 (Approved): Information Theory

Course Description

Mathematical models for channels and sources: entropy, information, data compression, channel capacity, Shannon's theorems, rate distortion theory.

Prior Course Number: 801.02
Transcript Abbreviation: Information Theory
Grading Plan: Letter Grade
Course Deliveries: Classroom
Course Levels: Graduate
Student Ranks: Masters, Doctoral
Course Offerings: Spring
Flex Scheduled Course: Never
Course Frequency: Odd Years
Course Length: 14 Week
Credits: 3.0
Repeatable: No
Time Distribution: 3.0 hr Lec
Expected out-of-class hours per week: 6.0
Graded Component: Lecture
Credit by Examination: No
Admission Condition: No
Off Campus: Never
Campus Locations: Columbus
Prerequisites and Co-requisites: Prereq: 6001 (804).
Exclusions: Not open to students with credit for 801.02.
Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No
The course is a GEC: No
The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001
Subsidy Level: Doctoral Course

Course Goals

Introduce information theory, the mathematical theory of communication
Use entropy as a measure of information
Learn information theoretic principles and literature for application in MS and PhD research

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Entropy and mutual information	6.0							
Asymptotic equipartition principle	3.0							
Entropy rate	3.0							
Data compression and discrete sources	5.0							

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Channel capacity	5.0							
Differential entropy	3.0							
Gaussian channels	5.0							
Rate distortion theory	6.0							

Grades

Aspect	Percent
Problem Sets	15%
Midterm exams (2)	35%
Final Exam	50%

Representative Textbooks and Other Course Materials

Title	Author
Elements of Information Theory, 2nd Ed, 2006	Cover & Thomas

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
**	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
**	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
***	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

UPdated Abbreviations, prereqs, exclusions, goals and topics to match university format.

deleted text Mathematical Theory of Communication byShannon & Weaver 3/26/12

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