

CSE 5032 (Approved): Foundations I: Discrete Structures

Course Description

Propositional and first-order logic; basic proof techniques; graphs, trees; analysis of algorithms; asymptotic analysis; recurrence relations.

Transcript Abbreviation: Fndns I: Discr Str

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Sophomore, Junior, Senior, Masters, Doctoral

Course Offerings: Autumn, Spring, Summer

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 2.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 3.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: 5022 or equivalent

Exclusions: Not open to students with credit for 625 or 680 or 2321.

Cross-Listings:

Course Rationale: To give non-majors (G and UG) the option to pick up pre-reqs in order to be prepared to take more advanced CSE courses.

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: 14.0901

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
BS CSE	BS Computer Science and Engineering

General Information

At least one term of calculus is highly recommended

Course Goals

Be competent with using propositional logic.

Be familiar with first-order predicate logic.

Be familiar with proving by contradiction, by ordinary induction and by strong induction.
Be familiar with using asymptotic notation.
Be familiar with analyzing running time of simple iterative algorithms.
Be familiar with graph theory.
Be exposed to analyzing running time of recursive algorithms.
Be exposed to sorting and searching.
Be exposed to designing graph algorithms.

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Mathematical reasoning.	12.0							
Analysis of simple algorithms.	6.0							
Sorting and searching.	9.0							
Graph theory.	9.0							
Graph algorithms.	6.0							

Grades

Aspect	Percent
Homework	20%
Classroom participation	10%
Midterms, final	70%

Representative Textbooks and Other Course Materials

Title	Author
<i>Discrete Mathematics and its Applications</i>	Kenneth H. Rosen

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.

BS CSE Program Outcomes

Course Contribution		Program Outcome
***	a	an ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, and engineering;
	b	an ability to design and conduct experiments, as well as to analyze and interpret data;
**	c	an ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints such as memory, runtime efficiency, as well as appropriate constraints related to economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability considerations;
	d	an ability to function on multi-disciplinary teams;
*	e	an ability to identify, formulate, and solve engineering problems;
	f	an understanding of professional, ethical, legal, security and social issues and responsibilities;
	g	an ability to communicate effectively with a range of audiences;
	h	an ability to analyze the local and global impact of computing on individuals, organizations, and society;
*	i	a recognition of the need for, and an ability to engage in life-long learning and continuing professional development;
	j	a knowledge of contemporary issues;
**	k	an ability to use the techniques, skills, and modern engineering tools necessary for practice as a CSE professional;
**	l	an ability to analyze a problem, and identify and define the computing requirements appropriate to its solution;
**	m	an ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices;
	n	an ability to apply design and development principles in the construction of software systems of varying complexity.

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