

# CSE 2112: Modeling and Problem Solving with Spreadsheets and Databases for Engineers

## Course Description

Spreadsheet and database modeling/programming concepts and techniques to solve business and engineering related problems; efficient/effective data handling, computational analysis and decision support.

**Transcript Abbreviation:** Spreadsheet&DB4Eng

**Grading Plan:** Letter Grade

**Course Deliveries:** Classroom

**Course Levels:** Undergrad

**Student Ranks:** Sophomore, Junior

**Course Offerings:** Autumn, Spring, May + Summer

**Flex Scheduled Course:** Never

**Course Frequency:** Every Year

**Course Length:** 14 Week

**Credits:** 3.0

**Repeatable:** No

**Time Distribution:** 1.5 hr Lec, 1.5 hr Lab

**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:** 1211 (203) or 1212 or 1221 (205) or 1222 (202) or 1223 (201) or 204 or EnGraph 167 or Engr 1221, or 1281.01H, or 1281.02H, or CSE Placement Level A. Pre-req or Concur: Math 1151 or 1161.01 or 1161.02

**Exclusions:** Not open to students with credit for CSE 2111, 1111 or 1112 or 1113 or CSE 101 or CSE 105 or CSE 200.

**Cross-Listings:**

**Course Rationale:** ISE requested a spreadsheet and database course specifically for their majors and for engineers in general.

**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:** Baccalaureate Course

## General Information

This course is a GEC for Quantitative and Logical Skills.
Not intended for CSE or CIS majors.

## Course Goals

Be competent with programming spreadsheets by appropriately using simple and nested functions, including logical and numerical functions, basic statistical functions, time and date functions, and table lookup functions.
---

Be competent with designing/engineering spreadsheets to minimize errors in construction and modification, including appropriately using relative/absolute cell referencing.
Be competent with aggregating and summarizing multivariate data sets, including both numerical and categorical variables.
Be competent with importing into spreadsheets from large data sets in text format and with more than one data source.
Be competent with applying sound spreadsheet engineering principles in business contexts such as pro forma income and balance sheets, basic analysis of large data sets, and fundamental computations for financial, marketing, and operational analysis.
Be competent with using spreadsheets to effectively communicate their purpose and process, both on the computer and on paper.
Be competent with using spreadsheets to effectively communicate results using appropriate numerical and graphical tools.
Be familiar with concepts of relational databases.
Be familiar with using MS Access to create data tables, simple reports, and forms.
Be competent with solving problems using Access Query tools including selection queries, sorts, aggregation, calculations, inner/outer joins, and situations with datasets containing many-to-many relationships using multiple queries.
Be exposed to tools that facilitate lifelong learning of technology.
General Education overall goal statement: Students develop skills in quantitative literacy and logical reasoning including ability to identify valid arguments, use mathematical models, draw conclusions and critically evaluate results based on data.
General Education goal statement for Basic Computational Skills: Students demonstrate computational skills and familiarity with algebra and geometry, and apply these skills to practical problems.
General Education goal statement for Mathematical and Logical Analysis: Students comprehend mathematical concepts and methods to construct valid arguments, understand inductive and deductive reasoning, and increase general problem solving skills.
General Education goal statement for Data Analysis: Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize importance of statistical ideas.

## Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Spreadsheet Design, IF and Boolean Functions, Scenario Manager and Goal Seek	3.0		3.0					
More Boolean function options, calculations and reference functions.	3.0		3.0					
Excel Solver, Pivot tables, graphing	2.0		2.0					
Excel Statistical functions, Date functions, Text Functions and Data validation techniques	3.0		3.0					
Programming in Excel VBA	3.0		3.0					
Introduction to Database Design	1.0		1.0					
Writing Queries in Access - select queries, sorting, aggregating, writing expressions, using inner and outer joins.	3.0		3.0					
Summarizing Data - using data with many-to-many relationships and advanced querying techniques.	1.0		1.0					
Access Forms and Reports, Macros, and Programming in Access	5.0		5.0					
Using Excel as a Database - importing data, Excel data tables, filtering, sorting, subtotals, pivot tables; using text functions to manipulate data; advanced Excel tools: scenario manager, data analysis tools, and macros.	2.0		2.0					

## Representative Assignments

Lab 1 - Spreadsheet Design/IF and Boolean Functions
Lab 2 - Countif(s)/Sumif(s)/Large/Small/Rank
Lab 3 - Comprehensive Excel
Lab 4 - Data Analysis using Solver/Graphs/Pivot Tables

Lab 5 - Working with Dates and Statistical Functions
Lab 6 - Data Validation/Text Functions
Lab 7 - Macros and Programming using Excel VBA
Lab 8 - Database Design and Database Queries
Lab 9 - Inner and Outer Joins
Lab 10 - Access Forms and Reports
Lab 11 - Macros and VBA in Access
Lab 12 - Using Excel as a Database

## Grades

Aspect	Percent
Homework and In-Class Assignments	15%
Lab Assignments	25%
Quizzes (2@10% each)	20%
Midterm Exam	20%
Final Exam	20%

## 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.

Prepared by: Kathryn Reeves