

## General Information

<b>Course Bulletin Listing/Subject Area</b>	Computer Science & Engineering
<b>Fiscal Unit/Academic Org</b>	Computer Science & Engr - D1435
<b>College/Academic Group</b>	Engineering
<b>Level/Career</b>	Undergraduate
<b>Course Number/Catalog</b>	2111
<b>Course Title</b>	Modeling and Problem Solving with Spreadsheets and Databases
<b>Transcript Abbreviation</b>	Spreadsheets & DBs
<b>Course Description</b>	Spreadsheet and database modeling/programming concepts and techniques to solve business related problems; efficient/effective data handling, computational analysis and decision support. Addl topics: computer concepts, networking, project integration.
<b>Semester Credit Hours/Units</b>	Fixed: 3

## Offering Information

<b>Length Of Course</b>	14 Week, 12 Week (May + Summer)
<b>Flexibly Scheduled Course</b>	Never
<b>Does any section of this course have a distance education component?</b>	No
<b>Grading Basis</b>	Letter Grade
<b>Repeatable</b>	No
<b>Course Components</b>	Laboratory, Lecture, Recitation
<b>Grade Roster Component</b>	Lecture
<b>Credit Available by Exam</b>	Yes
<b>Exam Type</b>	EM Tests via Office of Testing
<b>Admission Condition Course</b>	No
<b>Off Campus</b>	Never
<b>Campus of Offering</b>	Columbus, Lima, Mansfield, Marion, Newark

## Prerequisites and Exclusions

<b>Prerequisites/Corequisites</b>	(Math 1130 or higher) or (Math 130 or higher under quarters)
<b>Exclusions</b>	Not open to students with credit for CSE 1111 or CSE 1112 or CSE 101 or CSE 105 or CSE 200

## Cross-Listings

Cross-Listings

## Subject/CIP Code

<b>Subject/CIP Code</b>	14.0901
<b>Subsidy Level</b>	Baccalaureate Course
<b>Intended Rank</b>	Freshman, Sophomore

## Quarters to Semesters

<b>Quarters to Semesters</b>	Semester equivalent of a quarter course (e.g., a 5 credit hour course under quarters which becomes a 3 credit hour course under semesters)
<b>List the number and title of current course being converted</b>	200, computer assisted problem solving for business

## **Requirement/Elective Designation**

General Education course:

Mathematical or Logical Analysis

The course is an elective (for this or other units) or is a service course for other units

## **Course Details**

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**Course goals or learning objectives/outcomes**

- 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 basic concepts of computing, components of a computer, and concepts of how the internet works.
- 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.

**Content Topic List**

- Introduction to Computing - hardware, software, operating system
- Spreadsheet Basics - creating a simple spreadsheet, relative/absolute cell referencing, using functions, using multiple worksheets; simple data analysis
- Decision Making with Spreadsheets - using Boolean logical operators/functions
- Financial and Date Functions - solving problems with variable inputs, financial and date computations using reference.
- Programming/Modeling - using spreadsheets and formula auditing for complex problems
- Introduction to Databases - theory and use of MS Access
- Writing Queries in Access - select queries, sorting, aggregating, writing expressions, using inner and outer joins
- Summarizing Data - using data with many-to-many relationships and advanced querying techniques
- Using MS PowerPoint - displaying data from Excel and Access; Object Linking and Embedding
- 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
- Additional Topics - MS Office integration using MS Word mailmerge; lifelong learning; finding information on new/unknown tools in computing
- Basics of Computer Networking - WWW architecture and protocols, and writing your own webpage

**Attachments**

- GE course proposal for CSE 2111 including assessment plan.pdf: GEC course proposal & assessment plan  
*(GEC Course Assessment Plan. Owner: McCaul Jr,Edward Baldwin)*

**Comments**

- If this is the semester equivalent of a quarter course "sequence" (the option that has been selected above), could you please indicate which other course(s) apart from CSE 200 are part of the quarter sequence. Thank you. *(by Vankeerbergen,Bernadette Chantal on 12/05/2011 10:32 AM)*
- My mistake, I marked the wrong option. *(by McCaul Jr,Edward Baldwin on 12/05/2011 07:44 AM)*

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	McCaul Jr,Edward Baldwin	12/02/2011 02:50 PM	Submitted for Approval
Approved	McCaul Jr,Edward Baldwin	12/02/2011 02:53 PM	Unit Approval
Approved	McCaul Jr,Edward Baldwin	12/02/2011 02:54 PM	College Approval
Revision Requested	Vankeerbergen,Bernadette Chantal	12/02/2011 05:38 PM	ASCCAO Approval
Submitted	McCaul Jr,Edward Baldwin	12/05/2011 07:44 AM	Submitted for Approval
Approved	McCaul Jr,Edward Baldwin	12/05/2011 07:45 AM	Unit Approval
Approved	McCaul Jr,Edward Baldwin	12/05/2011 07:46 AM	College Approval
Pending Approval	Nolen,Dawn Jenkins,Mary Ellen Bigler Meyers,Catherine Anne Vankeerbergen,Bernadette Chantal Hanlin,Deborah Kay	12/05/2011 07:46 AM	ASCCAO Approval

## Proposal for GE Approval

Course: CSE 2111

Course Title: Modeling and Problem Solving with Spreadsheets and Databases

### 1. GE Area: Category 1. Skills: B. Quantitative and Logical Skills: Mathematical and Logical Analysis

*Goals of the Quantitative and Logical Skills GEs:*

Students develop skills in quantitative literacy and logical reasoning, including the ability to identify valid arguments, use mathematical models, and draw conclusions and critically evaluate results based on data.

*Expected Learning Outcomes:*

1. *Basic Computational Skills:* Students demonstrate computational skills and familiarity with algebra and geometry, and apply these skills to practical problems.

2. *Mathematical and Logical Analysis:* Students comprehend mathematical concepts and methods adequate to construct valid arguments, understand inductive and deductive reasoning, and increase their general problem solving skills.

3. *Data Analysis:* Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

The requirement of the *Basic Computational Skills* subcategory is usually met by mathematics placement level *R* or above, or equivalent. The performance level is roughly equivalent to a good working knowledge of a high school Algebra II course.

The intent of the *Mathematical and Logical Analysis* subcategory is to focus on argument in a context that emphasizes natural language, mathematics, computer science, or quantitative applications not primarily involving data . . . Courses should emphasize the logical processes involved in mathematics, inductive or deductive reasoning, or computing, as well as the theory of algorithms.

The intent of the *Data Analysis* subcategory is to enable students to deal with problems of data-gathering, presentation, and interpretation. . . . Courses should include exposure to fundamental ideas of probability, involve use of computer programs in problems of data analysis, and include opportunities to present data using summary measures and graphical techniques.

Courses should be thought of in terms of their contribution to the requirement as a whole, although a course will only be considered to be in one of these subcategories – Basic Computational Skills, or Mathematical and Logical Analysis, or Data Analysis.

### 2. How do the course objectives address the GE category expected learning outcomes listed above?

Several of the course objectives directly address the learning outcomes listed. First, the use of simple and nested functions, including logical and numerical functions, basic statistical functions, time and date functions, and table lookup functions to program spreadsheets will sharpen students' algebraic skills and help them understand the application of these to practical problems.

Second, designing spreadsheets with a focus on minimizing errors in their construction and during modification will help students develop their ability to construct valid arguments. Applying

sound spreadsheet engineering principles in various business contexts such as income and balance sheets, and basic analysis of large data sets, will help students develop their problem solving skills. Further, solving problems using appropriate database queries and using mechanisms such as sorts, aggregations, joins, etc., will contribute to developing students' reasoning and analysis abilities.

Finally, learning to use spreadsheets to effectively communicate important summary information concerning multivariate data sets in numerical and categorical variables will help students develop their skills in presenting summary data using suitable graphical techniques.

### **3. How do the readings assigned address the GE category expected learning outcomes?**

There will be thirteen *labs* in the course. Each *lab assignment* in the course will be given in two parts, a *pre-lab* assignment and an *in-lab* assignment. The pre-lab portion of each lab will generally be taken from the text and serve to introduce the software tools. The pre-lab will also include simple problems that apply concepts discussed in the lectures. The in-lab assignment is meant to have the students apply, to specific problems, the knowledge and skills they acquire in the pre-lab and during lectures. The actual tasks will be handed out in the computer lab in scheduled lab meetings, and the necessary computer files made available at that time. These labs will be structured so that students can obtain appropriate help from teaching assistants.

The pre-lab portions of each lab assignment, in some sense, correspond to *readings* in other GE courses. The in-lab portions, in some sense, similarly correspond to the *written* assignments in other courses. Hence, here we consider how the pre-lab portions of three labs, #4, #7, and #11, address the learning outcomes of the *Quantitative and Logical Skills* category; and under (5) below, consider the in-lab portions of the same three labs.

The pre-lab portion of lab #4 will require students to create a spreadsheet representing specified budgeted and actual expenses under various categories (such as tuition, rent, etc.) for the Autumn semester; and write formulas that total the budgeted and actual expenses and the differences between the budgeted and actual expenses in each category as well as the totals. Next, the student will be required to add a *new* category of expense (*Netflix* subscription) to the spreadsheet; the formulas are required to automatically work correctly with the modified spreadsheet. Next, the student will be required to add a new spreadsheet representing Spring semester expenses by copying-and-pasting from the earlier spreadsheet and replacing the values in some categories with specified values; and checking that the formulas work correctly. Next, the student will be asked to create a *summary* spreadsheet that summarizes the budget for the whole year, by writing formulas that would obtain the values from the two existing spreadsheets, adding them appropriately, etc. Finally, the student will be asked to create a *pie-chart* and a *bar-chart* that show, by proportion, the actual expenses for the whole year in each category. Thus this activity will contribute to improving students' computational skills, applying them to practical problems, their general problem solving skills, and their ability to present summary data using graphical techniques.

The pre-lab portion of lab #7 will require students to design a *workbook* (consisting of a set of spreadsheets) that can be used by the sales staff of a mid-size swimming pool installation company. Students will not be asked to *implement* a workbook in the pre-lab, only design it. The design will be required to allow the sales staff to easily input information about the (desired) size of the proposed pool, other features such as the lining material, whether it will have a diving board, etc.,

input cost factors (such as how much the filtration system costs for pools of different volumes), the cost per square foot of various types of lining materials, etc. The student's workbook will be required to be designed so that, given this data, it allows to sales staff to arrive at a price for the proposed pool. The design is also required to be sufficiently flexible so that additional factors that might be specified in the in-lab portion can be accommodated easily. Again this activity will contribute to improving students' familiarity and facility with algebraic formulas, including the use of standard functions built into spreadsheet tools, as well as their ability to convert natural language expressions of given scenarios into precise computations.

The intent of lab #11 is to have a student go through the complete solution of a typical business problem requiring gathering of information, analysis of data, and the presentation of summary results. The pre-lab portion, students will be asked to work on a simple version of this. Students will have access (via *Carmen*) to a simple (*Access*) database containing information about a set of rental condos. The student will have to write a set of queries to create a summary by *renter*. Next, the student will have to create a detailed analysis using a *pivot table* that calculates, by owner, the number of condos owned, the total number of bedrooms in those condos, average weekly rental of those condos, and their appraised values. This activity will contribute to strengthening students' abilities with complex formulas and develop their abilities to apply logical analyses to various types of data and obtain summary results.

Thus the pre-lab activities in these and other labs (that are omitted for sake of brevity) will contribute effectively to help students achieve the expected learning outcomes of this GE category.

#### **4. How do the course topics address the GE category expected learning outcomes?**

Approximately three weeks of the course will be devoted to presenting essential ideas of spreadsheets, creating simple spreadsheets using relative and absolute cell referencing, using functions, multiple worksheets, using boolean operations, and performing simple data analysis. These are related to students' competence with essential computational skills, algebraic formulas, and applying them to practical problems and will contribute to increasing students' general problem solving skills. Another two weeks of the course will be devoted to exploring and using various financial and related functions of spreadsheets to solve more complex problems in a financial setting. Again, this discussion will contribute to improving students' abilities to solve practical problems.

Approximately three weeks of the course will be devoted to the use of databases to store complex information in practical applications, and to use various types of queries as well as sorting, aggregating, performing various types of joins to extract useful summary information from a database. Another two to three weeks of the course will be devoted to considering how spreadsheets and databases may be integrated in order to exploit the power of both to manipulate data, to perform *what-if* scenario analysis, etc. This will sharpen students' abilities to perform various types of valid reasoning in practical settings and improve their problem solving skills. Throughout, ways to present different types of data, including summary information, using graphical techniques will be stressed.

Throughout the course, students will learn and practice rigorous reasoning about the correctness of the formulas in their spreadsheets, including the incorporation of cross-checking techniques. Simply reasoning that this formula should give the same result as that one requires a significant degree of

logical analysis.

Thus a major portion of the course topics is directly related to the expected learning outcomes of this GE category.

### **5. How do the written assignments address the GEC category expected learning outcomes above?**

As noted earlier, the *in-lab* portions of the thirteen labs in the course, in some sense, correspond to the *written* assignments in other courses. Hence, here we consider how the in-lab portions of three labs, #4, #7, and #11, address the expected learning outcomes.

The in-lab portion of lab #4 will provide students with a *workbook* that contains data concerning a chain of sports equipment stores. The worksheet will include a worksheet for *employee wages*, another for *store data* (expenses, store hours, number of employees, average profit per customer, average number of customers per hour, etc.), a third for *janitorial costs*, a last one for unit constants and tax data (such as hours worked by full and part-time employees; number of weekdays and weekend days for the year; property tax rates; etc.). Students will be asked to create formulas that compute the costs for a single store for a period of one year using absolute and relative cell addressing so that the formulas can be copied over for computing the results for all the other stores. The student is required to create formulas for computing net profit for the year for a store (in such a way they can be used for computing profits for the other stores) and formulas for the whole chain. Next, the student is required to create a copy of the spreadsheet and modify some of the constant data (such as wages per hour for part-time employees, janitorial costs, etc.) to perform a what-if analysis of how the per store profits and the chain's performance will change, under these conditions; and another what-if analysis that determines the amount by which the wage expenses must be reduced if the chain is to generate a given level of profit. Finally, the student will be asked to create a stacked chart that presents a comparison, between stores, of their total expenses, gross profit, and net profit. Thus this activity will contribute to further developing students' computational skills, applying them to practical problems, their general problem solving skills, performing what-if analysis, and their ability to present summary data using graphical techniques.

The in-lab portion of lab #7 will have students implement the workbooks they have designed in the pre-lab activity. Several different sets of values for the various parameters (length, width, diving board or not, etc.) for the proposed swimming pool will be provided in a file. Additional data specifying component pricing (cost of excavation per cubic yard, cost of lining material per square foot for each type of material, etc.) will also be provided. The students will be required to check that their implemented workbooks calculate the cost for each set of parameter values. Next, the students will be asked to modify their workbooks to account for a *financing option* for the pool. Students will have to use appropriate *finance* functions (provided by *Excel*) to compute the monthly payments or duration of loan respectively for two different possible financing options, one that includes a specified down payment, duration of the loan, and amount of *balloon* payment; another that has no down payment or balloon payment, and the amount of monthly payment being specified; the rate of interest, compounded monthly, is specified in both cases. Finally, the student will be asked to create column charts that show the costs for the three proposed pools, including the component costs; and the monthly payments for each of the two financing options. Thus this



activity will contribute to developing students' computational skills, including an appreciation of complex financial computations, applying them to practical problems, performing what-if analysis, and their ability to present summary data using graphical techniques.

As noted earlier, the intent of lab #11 is to have a student go through the complete solution of a typical business problem requiring gathering of information, analysis of data, and the presentation of summary results. In the in-lab portion, students will be given three database tables, the first containing information about *accounts* in a bank, there being one record for each account; the second containing information about *payments*, there being one record for each payment; and the third containing information about *charges*, there being one record for each credit card charge. The bank has account holders in a number of states but its credit card business is currently in a subset of those states. The goal of the exercise is to determine whether it would be profitable to extend the credit card business to the other states by analyzing the data to see the amount of fees, penalty, and interest generated by the customers in the current credit-card states; and presenting the results by state. To deal with this problem, students have to first write suitable queries that extract the necessary information from the given tables and import them into a suitable spreadsheet; write formulas in the spreadsheet that compute, for each charge account, the current balance, whether the balance exceeds the account's allowed credit limit, the fees and penalty if it does, interest, etc., and total balance. Next, the students have to create formulas that compute summary results for each state, including the number of accounts, total overlimit fees, total interest payments, total account balance, average balance, etc; and design a worksheet that displays the summary results. Next, the students will be asked to *filter* the results by including only accounts that have a non-zero penalty (for going over the credit limit); and to *sort* the original results according to a specified criterion such as the amount of interest payment. Next, the students will be asked to use the mechanism of *pivot tables* to create a multivariable summary that shows, by state and credit card type, the number of accounts and the total fee accrued in those accounts. Finally, the students will have to create suitable charts that present the results of their analysis. Thus, as in the case of the other in-labs, this activity will contribute to further developing students' computational skills, combining the abilities of different tools, applying them to practical problems, sharpen their general problem solving skills, performing what-if analysis, and their ability to present summary data using suitable graphical techniques.

## 6. Course Assessment Plan

As detailed under (3) and (5) above, the pre-lab and in-lab activities of the thirteen labs are designed to help students achieve the various desired learning outcomes. In addition to the thirteen labs, there will be three midterms and a final exam in the course. Each will include some multiple-choice questions, some questions that ask for essay-type answers, and some that ask students to solve specific problems (such as designing formulas to perform specified calculations in a given spreadsheet and writing queries to extract certain information from a database, etc.). The questions on the exams will be designed to assess the extent to which students have achieved the learning outcomes. A couple of examples of the type of question that students may be asked to answer in the final exam of the course may be useful.

i. Several worksheets have been designed to help track the items in stock in a toy store. The *Items* worksheet contains the name of each item, the company that makes it, its *id*, the wholesale unit cost of the item, and the quantity sold in the previous month. The *Markup* worksheet contains the percentage markup for each item, by its *id*. The *Misc* worksheet contains, by *id*, the shipping cost that the manufacturer charges for each unit; *true/false* indicating whether the item needs adult assembly; *true/false* indicating whether the item is safe for children under three years of age; and the *shipping weight* per unit of the item. Assume the store's shipping charges are \$2.00 per 5 lbs (or less).

You want to start a *layaway* plan at the store. You want to allow customers to put an item in layaway for 3 months and make weekly payments for the item. You will charge 10.5% annual interest, compounded monthly for this service. Write a formula that will compute the weekly payment for a particular brand of bicycle, with a given *id*. Make sure you account for the cost of the item, the shipping costs charged by the manufacturer, the markup, the shipping fee charged by the store, etc.

ii. Consider the same store but assume that some information is now in the form of a number of *tables* in a database. The *Items* table contains information about each item in stock: its *id*, name, supplier *id*, wholesale cost (including shipping), and retail cost (including markup and shipping charges); as well as the number of units in stock at the start of the month. The *Sales* table contains information about all sales; for each sale of an item, its *id*, the quantity of the item sold, and the date of the sale are included. The *Returns* table contains information about returned items; for each return transaction, the *id* of the item returned, the date of the return, and reason for return are included; assume that only one item is returned per return transaction. Write a query to summarize total revenue, by item *id*, for all items sold; don't worry about items that were returned. This query should return item *id*, item name, and total revenue. Write a second query that will return a list of items (by *id* and name) that fall into one of the following categories: *Krazy Racers* that were returned because they were broken; or *Barbie Dolls* that were returned because the child hated them.

Student performance in the pre-lab and in-lab activities and the exams will be assessed by the instructor for each offering of the course who will then prepare a summary addressing the following questions:

a. Do students develop a reasonable ability to program spreadsheets by using simple and nested functions, including logical and numerical functions, basic statistical functions; and to import data from multiple sources?

- b. Do students design spreadsheets in such a way as to minimize errors during construction and modification, including appropriate use of relative/absolute cell referencing?
- c. Are students able to design spreadsheets that solve typical business problems such as income and balance sheets, and perform essential computations for financial and marketing analysis?
- d. Are students able to arrive at simple multivariable summaries using *pivot tables*?
- e. Do students develop an ability to present suitable summaries of information that may be typical of small and medium businesses using suitable graphical techniques such as bar charts?

Of course, students' abilities with respect to using bar charts and the like to present summary information will be difficult to assess in examinations although some essential aspects such as knowledge about what the strengths and weaknesses of particular graphical techniques and which to use for what purposes can indeed be assessed; and questions to do so will be included in the final exam. In any case, the instructors' summary will be based on student performance on both the labs as well as in the exams. These summaries will be maintained by the course coordinator. Immediately after the Spring semester of each year, the course coordinator will prepare an overall summary, based on the summaries created by the individual instructors, of the extent to which students in the course achieve the intended learning outcomes, highlighting any that show particular weaknesses or strengths, and proposing changes in the course to help address the weaknesses. Starting in Autumn Semester 2013 and then every other Autumn semester, the coordinator will present, to the CSE Curriculum Committee, her summary evaluations and ideas for possible changes in the course to help address any weaknesses in achieving any of the learning outcomes. Changes that the committee approves of will be implemented in the following semester. Summaries of the assessment results and actions taken to improve the course will be submitted to the GE Assessment Committee once every three years.

As detailed in (2), students' abilities listed in (a) through (e) relate directly to the learning outcomes and the intent of the *Quantitative and Logical Skills* GE Category. Thus the assessment plan described above and the actions to be taken based on the assessment results will ensure that the course helps students achieve the expected learning outcomes of the category.

## **7. Course Syllabus**

See next page

**CSE 2111**  
**Modeling and Problem Solving with Spreadsheets and Databases**  
**3 Credit Hours**

**1. Instructor:** *varies by semester*

**2. Course Coordinator:**

- Name: Debby Gross
- Office: DL 489
- e-mail: gross.142@osu.edu
- Phone: 292-7946

**3. Class meetings** (per week): Two 55-minute lectures, one 55-min. lab, one 55-min. recitation

- Days, times, room: *varies by semester*

**4. Course number, title, description:**

CSE 2111: Modeling and Problem Solving with Spreadsheets and Databases: Spreadsheet and database modeling/programming concepts and techniques to solve business related problems; efficient/effective data handling, computational analysis and decision support.

**5. Student Learning Goals and Objectives:** This course is a GE Course, Category 1. Skills, B. Quantitative and Logical Skills, (2) Mathematical and Logical Analysis:

*Goals of the Quantitative and Logical Skills GEs:*

Students develop skills in quantitative literacy and logical reasoning, including the ability to identify valid arguments, use mathematical models, and draw conclusions and critically evaluate results based on data.

*Expected Learning Outcomes:*

*1. Basic Computational Skills:* Students demonstrate computational skills and familiarity with algebra and geometry, and apply these skills to practical problems.

*2. Mathematical and Logical Analysis:* Students comprehend mathematical concepts and methods adequate to construct valid arguments, understand inductive and deductive reasoning, and increase their general problem solving skills.

*3. Data Analysis:* Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

To fulfill *Quantitative and Logical Skills* Goals and Learning Outcomes, students will leave the course with the following:

- a. Ability to program spreadsheets by using simple and nested functions, including logical and numerical functions, basic statistical functions; and to import data from multiple sources.
- b. Ability to design spreadsheets to minimize errors during construction and modification, including appropriate use of relative/absolute cell referencing.
- c. Ability to design spreadsheets that solve typical business problems such as income and balance sheets, and perform essential computations for financial and marketing analysis.

d. Ability to use a database to create simple data table, reports and forms; and the ability to use suitable selection queries, sorts, joins etc. to extract and organize data from given databases.

e. Ability to use suitable graphical techniques, especially charts of various kinds, to present data and summary information in appropriate ways.

## 6. Description of course:

*a. Course structure:* The course will meet twice a week for lectures. The content of the lectures will be reinforced in once-a-week recitations. There will be thirteen labs which will require the students to apply the concepts and techniques to solve problems of a range of difficulties. Each lab will consist of a pre-lab portion that help the student become familiar with the software tools and go through some application of the concepts to solve some problems. The in-lab portion of each lab will be completed by students under supervision in once-a-week computer labs. Attendance in these supervised labs to complete the in-lab portion of each lab will be required. These activities will ensure that the students acquire the abilities listed above.

*b. Course topics:*

1. Spreadsheet Basics - creating a simple spreadsheet, relative/absolute cell referencing, using functions, using multiple worksheets; simple data analysis.
2. Decision Making with Spreadsheets - using Boolean logical operators/functions.
3. Financial, Reference, and Date Functions - solving problems with variable inputs, financial and date computations using reference.
4. Programming/Modeling - using spreadsheets and formula auditing for complex problems.
5. Introduction to Databases - theory and use of MS Access. Writing Queries in Access - select queries, sorting, aggregating, writing expressions, using inner and outer joins.
6. Summarizing Data - using data with many-to-many relationships and advanced querying techniques; using charts to present summary results.
7. Importing data, data tables, filtering, sorting, subtotals, pivot tables; using text functions to manipulate data; advanced Excel tools: scenario manager, data analysis tools, and macros.

*c. Labs:*

Lab 0: Using the CSE computing environment; web search on ethical issues related to IT.

Lab 1: Creating a basic spreadsheet.

Lab 2: Excel basics and writing simple formulas.

Lab 3: Data analysis using Excel functions.

Lab 4: Solving Problems with multiple worksheets and charts.

Lab 5: Using Boolean Logic in Decision Making.

Lab 6: Using spreadsheets with variable inputs and financial calculations.

Lab 7: Analysis of large problems and design/implementation of a spreadsheet solution.

Lab 8: Using Access - tables, preset queries, forms and reports.

Lab 9: Writing simple queries.

Lab 10: Advanced querying to relate data with many-many relationships.

Lab 11: Data retrieval, analysis, and presentation.

Lab 12: Importing data and data manipulation.

Lab 13: Mailmerge and other Excel tools.

**7. Required texts:**

- a. Custom text: CSE200: Extracts from “Computer-Aided Problem Solving for Business” by Shelly and Vermaat and from other texts; includes on-line materials
- b. Course notes; available from Uniprint.

**8. Length/format of lab assignments, papers, exams, etc.:**

There will be thirteen labs, each of which will consist of a *pre-lab* portion and an *in-lab* portion. The pre-lab portions will be completed by the students working on their own. The in-lab portions will be completed in supervised, scheduled lab sessions.

There will be no papers in the course.

There will be three mid-terms and a final exam. Each will include some multiple-choice questions, some questions that ask for essay-type answers, and some that ask students to solve a specific problems (such as writing formulas to perform specified calculations in a given spreadsheet and queries to extract certain information from a database, etc.).

**9. Grading information:**

The labs will be worth 20% of the grade. The first midterm will be worth 10%; the second and third worth 15% each. The final exam will be worth 40% of the grade.

It is worth noting that although, for most students, the labs will require a considerable amount of work, they are only worth 20% of the total grade because of the potential for cheating in those labs. But the work that students do in the labs will not be “wasted” in any sense. Instead, students who take the labs seriously and perform well in them, will find themselves well-prepared for the midterms and the final and will do well in them.

**10. Grading scale:**

90% and above:	<i>A</i> −, <i>A</i>
80% – 89.9%:	<i>B</i> −, <i>B</i> , <i>B</i> +
70% – 79.9%:	<i>C</i> −, <i>C</i> , <i>C</i> +
60% – 69.9%:	<i>D</i> , <i>D</i> +
Below 60%:	<i>E</i>

**11. Schedule of exams:**

The first midterm will be in week 4; the second in week 9; and the third in week 12. The final exam will be at the time scheduled by the Registrar’s Office.

**12. Class attendance policy:**

Students are expected to attend both lectures and closed-labs. Students are responsible for all material covered, all assignments given, and all due dates announced. No credit will be given for lab assignments if the student does not attend the closed-lab.

### **13. Weekly topical outline:**

- a. Introduction to Computing - hardware, software, operating system. (1 week)
- b. Spreadsheet Basics - creating a simple spreadsheet, relative/absolute cell referencing, using functions, using multiple worksheets; spreadsheets for data analysis; Labs 1, 2. (2 weeks)
- c. Decision Making with Spreadsheets – using Boolean logical operators/functions; Lab 3. (1 week)
- d. Financial, Reference, and Date Functions – solving problems with variable inputs, financial and date computations using reference; Labs 4, 5. (1.5 weeks)
- e. Programming/Modeling – using spreadsheets and formula auditing for complex problems; Lab 6. (1 week)
- f. Introduction to Databases – theory and use of MS Access; Lab 7. (1 week)
- g. Writing Queries in Access – select queries, sorting, aggregating, writing expressions, using inner and outer joins; Labs 8, 9. (1.5 weeks)
- h. Summarizing Data - using data with many-to-many relationships and advanced querying techniques; Lab 10. (1 week)
- i. Displaying data from Excel and Access; Object Linking and Embedding; Lab 10 (contd.). (1 week)
- j. 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; Lab 12. (2 weeks)
- k. Other topics (web architecture; integration of office tools; etc.); Lab 13. (1 week)

### **14. Academic misconduct:**

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct at:

[http://studentaffairs.osu.edu/info\\_for\\_students/csc.asp](http://studentaffairs.osu.edu/info_for_students/csc.asp)

### **15. Disability services:**

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services (ODS) is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901. The ODS website is at:

<http://www.ods.ohio-state.edu/>