

SURE 272: Geomatics Computation

**Winter
2005/06**

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**Office Hours: T 3:00-3:50, W 9:00-9:50,
R 3:00-3:50, F 12:00-12:50**

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COURSE DESCRIPTION

- Exploring fundamental concepts of visual programming to solve surveying and mapping related problems. Topics covered include: object oriented syntax for looping and if statements, input/output statements, arrays, user-defined functions and procedures, reading and writing text and binary files, and introduction to database programming and graphics. Programming projects may include: angular units conversion; transformation of coordinates from polar to rectangular and rectangular to polar; traverse computation, adjustment and plotting.

Textbook: AN INTRODUCTION TO PROGRAMMING USING VISUAL BASIC.NET, 5th edition, by D. Schneider

Reference: SAMS TEACH YOURSELF VISUAL BASIC 6 IN 21 DAYS, by G. Perry

COURSE SCHEDULE:

- Lecture: T, R 8:00-9:15, SWN 207



Week 1 Jan 9 - 13	Introduction: Understand course objectives, grading policy, etc Why Programming with Visual Basic; Designing an algorithm; creating a VB Application environment	Chapter 1 Chapter 2
Week 2 Jan 16-20 (No class Jan 16)	Creating a Visual Basic Application, Objects; Command button label – and Events; Numbers and Strings	Chapter 3

Week 3 Jan 23-27	Creating a Visual Basic Application; Input and output, build-in functions	Chapter 3
Week 4 Jan 30-Feb 3	Procedures, Function Procedures, Structured Programming	Chapter 4
Week 5 Feb 6-10	Logical operators, If statement, Select-Case blocks	Chapter 5
Week 6 Feb 13-17	Mid-Term Exam #1 Feb 16 Repetition, Do-Loops, For-Next loops	Chapter 6
Week 7 Feb 20-24	Arrays, Creating and accessing an array	Chapter 7

Week 8 Feb 27-Mar 3	Passing an array between procedures, Two dimensional arrays, Sorting and Searching	Chapter 7
Week 9 Mar 13-17	Sequential files, Open, Append, Write, Kill, Close, Error trapping	Chapter 8
Week 10 Mar 20-24	Sequential Files	Chapter 8
Week 11 Mar 27-31	Additional controls and objects, List box, Check box, Common Dialog Control. Surveying programming project 1	Chapter 9

Week 12 Apr 3-7	Mid-Term Exam 2, Apr 6 Additional controls	Chapter 9
Week 13 Apr 10-14 (No class Apr 13- 14)	Database management, the data control, relational database and SQL	Chapter 10
Week 14 Apr 17-21	Database management	Chapter 10
Week 15 Apr 24-28	Surveying programming project 2	
Week 16	Final Exam: Day and time to be announced	

CLASS WORK

- All work will be due on the date specified
- Late assignments will be assessed a penalty of 5% per day or fraction thereof
- All work must be completed to receive a passing grade for this course
- No assignments will be accepted after the unit exam in which the assignment was given

ASSIGNMENT WORK

- Each assignment will be submitted in a report folder.
- A cover sheet will be included with each assignment identifying the assignment, student name, and class
- Unless otherwise stated, only one assignment per folder will be accepted

ASSIGNMENT WORK

- Assignments will be typed, double spaced
- Programming assignments will contain:
 - Disk containing program, sample data and sample output
 - Executable version of the program
 - Printout of source code
 - Printout of sample input and output (maximize screen then press Print Screen and paste the image into a Word file)
 - Instructions on how to execute the program

SAMPLE PROGRAM CODE

```
' Program Hirvonen
Private Sub cmdExecute_Click()
' Procedure to compute the latitude, longitude and height of a point given the
' Rectangular coordinates and a user selected ellipsoid using the method presented
' by Hirvonen and Moritz

Dim iterate As Integer      'iterate keeps track of the number of iterations to solve
Dim a As Double, e2 As Double, f As Double, pi As Double, dphi As Double
Dim X As Double, Y As Double, Z As Double, N As Double
Dim latitude As Double, longitude As Double, height As Double, phi As Double

' a is the semi-major axis of the ellipse, e2 is the second eccentricity squared
' f is the flattening, pi is pi and dphi is the difference in latitude in the iteration process
' X, Y, Z are the Cartesian coordinates of the point
' N is the radius of curvature in prime vertical
' latitude and phi are the latitude of the point, where latitude is computed from phi in iteration
' longitude is the longitude of the point and height is the height

pi = 4 * Atn(1)
dphi = 100
iterate = 0
picOutput.Cls
Call Title      'Procedure formats output on the form

' Input the Rectangular Coordinates of the point: X, Y, Z

X = Val(txtX.Text)
Y = Val(txtY.Text)
Z = Val(txtZ.Text)
```



SAMPLE FORM OUTPUT

A screenshot of a software application window titled "Cartesian to Geographic Coordinate Conversion". The window has a blue title bar and standard Windows window controls. The main area is light beige. At the top, it says "Select the Datum from the list below" with a dropdown menu set to "Geodetic Reference System 1980". To the right are three input fields for X, Y, and Z coordinates. X is 354327.587, Y is -4606955.685, and Z is 4382483.757. Below these are "Execute" and "End" buttons. The output area contains the following text:

Transformation from Cartesian to Geodetic Coordinates
Using the method from Hirvonen and Moritz

The Rectangular Coordinates of the point are:

X	Y	Z
354327.587	-4606955.685	4382483.757

The parameters for the Geodetic Reference System 1980

Semi-major axis (a)	Inverse flattening (1/f)
6378137	298.257222101

Longitude = -85 -36 -7.0473

Begin estimation of latitude

Iteration # 0 Latitude = 43 -40 -38.6544
Iteration # 1 Latitude = 43 -40 -38.6158
Iteration # 2 Latitude = 43 -40 -38.6156

Height = 356.9598

ATTENDANCE POLICY

- Each student will be allowed to miss up to 4 classes, either lectures or lab, without penalty
 - These absences may be for any reason and do not require giving me an excuse
 - A student who is absent a fifth time will be required to withdraw from the course if this absence occurs during the withdrawal period of the semester
 - If this absence occurs after the withdrawal period the student will receive a failing (F) grade in the course
- All laboratory absences must be made up during the semester.

ATTENDANCE POLICY

- Exceptions to the Attendance Policy (Verification is necessary):
 - A University-sponsored event in which an excused absence from the Vice President for Academic Affairs office is given.
 - Death of a family member or close personal relation (friends, neighbors).
 - Extended hospitalization (this does not apply to a visit to the health center because of a cold or other illness).
 - Jury duty or being subpoenaed to testify in a court case.
 - Dangerous weather conditions in which driving is considered by local authorities to be unsafe (for commuter students).

EXCEPTIONS NOT LIKELY TO BE APPROVED:

- Day care problems
- Employment commitments
- Being in jail
- Transportation problems

CLASS CONDUCT

- Class starts on the hour so please make every effort to arrive on time by planning ahead for any contingencies.
- Class lasts for 75 minutes so do not begin to pack up your books and other items early. This is very distracting to me and your fellow students. You are expected to participate throughout the entire class period.
- Turn off all cell phones, pagers, pda's and other electronic devices before class. If there are extenuating reasons, please see me.
- During the lecture, feel free to ask questions, but refrain from conducting personal conversations. Again, this is very disruptive.
- When you leave the classroom, please pick up after yourself. Try to leave the room cleaner than when you found it.

CLASS CONDUCT

- Sleeping, eating and reading newspapers are not allowed in class. While in class the student is expected to pay attention and participate in this class and not finish work for another class during this class periods.
- Come to class prepared. Instructional material students should not be without include, as a minimum, writing material, computer disks and calculators.
- Students are expected to check the web page for this course weekly and students are responsible for all material on this web page along with textbook and other readings.

PERFORMANCE CRITERIA/ GRADING

60% from exams
40% from assignments
100% TOTAL

90 - 100% - A Range
80 - 89% - B Range
70 - 79% - C Range
60 - 69% - D Range
0 - 59% - F Range

- If student misses exam, it is their responsibility to make arrangements to take the exam prior to the next class
- Exam questions will generally be Short-Answer type – most will involve interpreting or writing VB code
- Final exam is a cumulative exam