VANCOUVER ISLAND UNIVERSITY

SCIENCE & TECHNOLOGY
FORESTRY

FRST 121 – Spatial Data

Fall Course Outline

Locations & Times:

Classroom
TBA

Computer Lab
TBA

Instructors:

TBA

Description

This course is an introduction to spatial data as used in natural resource management. You will gain the skills and knowledge needed for working with maps, images and associated data. Topics include: mapping systems, interpretation of topographic and thematic maps, calculations from maps and photos, field orienteering, GPS, interpretation of image features, web mapping applications and satellite imagery. This course complements the field surveying and mapping skills covered in FRST111.

Computer applications and basic math skills will be covered as required and as they relate to spatial data.

Scope and Credit

This course is designed for students in the first year of the **Forest Resources Technology Program** but is also appropriate for those interested in map use, field orienteering and use of technology in spatial data. **Credits: 3**

Course Format

Classes will include lectures, activities, discussions and labs (map, photo, field and computer). Note that computer labs are on Friday afternoons in a different building. Most labs are indoors, but we will be in the field for orienteering and GPS. The course is 6 hours per week (3 x 2-hour blocks), with roughly equal lecture / lab time.

Text and Supplies

There is no required text, but this book is an excellent reference: **Map Use & Analysis**, 4th Edition, Campbell, John, McGraw-Hill, 2001. There are 3 copies on reserve in the library. Useful websites are listed later in this document and posted online in D2L.

Lab Supplies: You are required to have the supplies in the **Forestry Kit** (available at the VIU Bookstore). You must bring your kit or equivalent supplies to all labs.

Field Labs: Personal protective equipment (caulk boots, hard hat, hi-viz vest, safety eyewear, first aid kit) and appropriate clothing are required for outdoor labs.

Learning Outcomes

Upon successful completion of the course, students will be able to:

1. Define and use the **technical terms** applicable to spatial data in conversation with peers and in technical reports.

2. Describe how the shape of the Earth affects the **graticule** (i.e. latitude and longitude) and how that impacts locational reference.

3. Describe how the NAVSTAR **GPS** system works, outline sources of error and be able to use a recreational GPS unit and smart device (iPad) to navigate and find waypoints.

4. Describe the **projections** commonly used for BC mapping and the associated distortions associated with map projections.

5. Describe the basic science of **remote sensing** as used in **vertical aerial photography, satellite imagery** and **LiDAR**.

6. Annotate and orient air photos for **stereo viewing** and identify natural landscape and forest features.

7. Utilize federal and provincial **mapping systems** (NTS and BCGS) to order maps for any given location in BC at an appropriate scale.

8. Using either a map or 'the real world' as a reference, determine and delineate **north** on an air photo.

9. **Navigate** in the forest using maps and/or air photos.

10. Apply basic **math skills** required for common calculations in map and air photo use:

    a) **Convert** between the various metric and imperial units

    b) Using **similar proportions**, determine

    > the scale for maps and air photos and calculate lengths

    > interpolate coordinates both in UTM and lat/long

    c) Using **dot grid** and **line transect** methods determine area in m^2 and ha

    d) Using **trigonometry** calculate

    - slope measures (slope distance and slope angle in percent and degrees)

    - bearings, based on UTM coordinates

11. Use basic functions in **Excel** to manipulate and present data, including

    - Formatting (font, alignment, decimal display, borders, shading, page set-up, etc.)

    - functions (e.g. sum, average, min/max, trig, use of parentheses, cell addressing (relative & absolute), powers & square root)

    - logical operators (If and Lookup statements), and

    - graphing (create & format various graph types (pie, scatter, bar, etc.)

In addition to the **subject-specific** learning outcomes listed above, specific **program** objectives will be covered. Upon successful completion of this course students will have furthered their ability to:

1. Use **math skills** appropriate to the field of forestry, including: algebra, proportions, and trigonometry.

2. Use **technology** appropriate to the field of forestry, specifically the effective use of:
   a. D2L - course management platform
   b. iPad for field navigation and in-class collaboration
   c. spreadsheets (Excel), RoadEng and Geomatica

Course Communications

All information regarding the course will be distributed through the course "D2L" website through **VIU Learn** at: **http://learn.viu.ca**

You will be automatically enrolled in the FRST121 website with your course registration. You are responsible for checking the website at least weekly for notices and assignments. If your email has changed since registration, make sure that you provide an up-to-date version.

Evaluation (sample)

Here is the breakdown of how your grade in the course will be determined (subject to minor adjustments):

Labs (map-10, Excel-15)	**25%**
Midterm Exam	**20%**
Final	**30%**
Quizzes	**15%**
Professionalism	**10%**

Quizzes will consist of short answer questions that will cover recent course material and reading assignments. Any missed quizzes will receive a grade of zero.

Students are expected to monitor and actively participate in online discussions.

Some labs are pass/fail; others will be fully or partially marked. All labs will count towards the lab grade using a points system described in class.

Grades will be calculated using the VIU standard grade scale (see D2L Forestry Portal).

Assignments

The format and other specifications for lab assignments will be provided in a written description. Occasionally, an update or correction is required. You are responsible for noting and following any changes described in class.

The date and time when lab reports are due will be given in the written description. Unless you have a valid excuse (e.g., illness), all work must be handed in when due in order to receive full marks. No marks will be awarded for late assignments if marked work has already been returned to the rest of the class.

Academic Policies

For further information on academic policies and academic misconduct (e.g., plagiarism), please refer to the D2L Forestry Portal.

Sample Course Schedule

Week			
1	**Labour Day**	**Field Trip - TimberWest**	Course Introduction VIU-Learn (D2L) Workshop
2	Map Basics Mapping Systems, Ordering Maps	**iPad Basics** Dropbox, PDF Maps	**First Aid Course**
3	Generalization, Map Scales & Unit Conversions	**iPad Basics** PDF Expert & "Notes"	File management, Excel Basics **Lab 1: Excel Calculations I**
4	Area Calculation	Georeferencing, Datum, Coordinate dd.mm.ss – dd.ddd	Resume writing workshop
5	**Lab 2: Map Calculations I**	Map Projections, North (true – magnetic – grid) Orienteering Prep	Excel Calculations II
6	**Field: Woods Orienteering**	**Exam 1**	Excel Graphics
7	**Thanksgiving**	Map Projections & Coordinates (interpolation)	**Lab 3: Excel Graphics II**
8	Location on map: UTM (dist. & direction) & triangulation	Terrain - Topography	Intro to RoadEng
9	Intro. to Air Photos Air Photo Geometry	Air Photo scale & measurements	FRST111: Mapping with RoadEng
10	**Lab 4: Map Calculations II**	Stereoscopic viewing, ordering air photos	**Exam 2**
11	LIDAR (guest speaker – Steve Platt, Strategic	Satellite Imagery (guest speaker – Hannah Wilson, Geog.)	RGB & false colour
12	Introduction to GPS	**GPS Field Skills**	GPS & Google Earth
13	GPS Forestry Apps. (guest speaker – Jeff Sandford)	Air Photo Interp.	Google Earth: Image Interp.
14	**Review**	*Study Days*	*Exams start*