AP444

Computer Assisted Mass Appraisal

3 Credits

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Computer Assisted Mass Appraisal

Calendar Description

This is an advanced hands on course in which students continue to use their laptops and the SPSS statistical package to develop cost and direct sales computer assisted mass appraisal (CAMA) models. Topics include more complex modelling and valuation techniques such as nonlinear programming and neural network. The integration of GIS (Geographic Information Systems) and CAMA (Computer Assisted Mass Appraisal) is also studied.

Rationale

This is a required course for Real Estate Appraisal and Assessment students. It is an essential course for any student planning to pursue a career involving the valuation of groups of real property. Mass appraisal, the systematic estimation of property values using computer assisted modelling, is currently being adopted as the main technique for estimating property value for taxation of real property assessment.

Prerequisites

AP344 and MA201

Co-Requisites

None

Course Learning Outcomes

Upon successful completion of this course, students will be able to

Lesson No. 1

1. discuss the basis for mass appraisal and the capabilities, advantages, and disadvantages of various modelling methods.
2. describe the steps in developing a mass appraisal model application.
3. explain and interpret the statistics and graphics used in developing mass appraisal models.
4. use statistical software as a tool for creating and analyzing mass appraisal models.

Lesson No. 2

1. use graphic analysis to determine relationships between the given variables and the adjusted sale price.
2. use graphic analysis to determine relationships among potential independent variables.
3. use correlation analysis to determine relationships among potential independent variables.
4. analyze a database to determine the need for a time adjustment and apply techniques to make any necessary time adjustments.
5. analyze variables to determine the existence of outlier observations and determine the need to remove these.
6. determine if there are enough observations of specific characteristics to allow the use of these in further regression modelling.
7. determine the need to transform variables for use in the modelling process.

Lesson No. 3

1. evaluate and choose the most suitable method for land valuation given available sales information.
2. develop a land residual for valuation situations where there are no vacant land sales available.
3. develop a valuation model using land residuals and additive multiple regression.
4. develop a valuation model using land residual and multiplicative multiple regression analysis.
5. develop a land size adjustment factor based on land residuals.
6. develop a land rate per unit using size adjusted land residuals.
7. test and adjust land values using land characteristics and locational factors.

Lesson No. 4

1. specify and explain an appropriate model for mass appraisal using the cost method.
2. use sale prices to develop a depreciation factor for the building portion of the cost model.
3. transform variables to make use of the cost data provided in a building replacement cost calculation.
4. calculate depreciated replacement cost new (RCN) for a property database.
5. create appropriate market adjustment factors for variations in building characteristics.
6. calculate a cost approach value by adding market adjusted building value to previously developed land value.
7. determine and apply needed adjustments for general factors such as location.

Lesson No. 5

1. complete in-depth data screening and exploratory data analysis, building on the preliminary screening techniques demonstrated in Lesson 2, including transforming variables as necessary.
2. apply the multi-step process for regression modelling to specify, calibrate, and test a sales-based valuation model.
3. test the performance of the valuation model using a variety of parametric and non-parametric approaches, and make any necessary refinements.
4. discuss the importance of testing the influence of individual variables not included in the final specified model.
5. test the model using a hold-out sample (sales data not used to develop the model) to determine its suitability for general valuation.

Lesson No. 6

1. explain the basis for non-linear regression and outline how it differs from other model structures.
2. describe the differences among additive, multiplicative, and hybrid models.
3. identify the types of variables in a hybrid model and the form each variable may take.
4. specify a non-linear model structure.
5. correctly transform any variables to a proper format for use in non-linear regression.
6. apply non-linear regression to calibrate a valuation model.
7. test a non-linear valuation model using a training set (the data used to create the model) and make any necessary corrections.
8. test a non-linear model on a holdout sample (data not used to develop the model) to determine its usefulness for general valuation.

Lesson No. 7

1. develop a simple additive model for determining capitalization rates to assist in the valuation of apartment buildings.
2. test the model, using the sales provided, to check the accuracy of the capitalization rate estimated and its usefulness in estimating sale price.
3. test the model by comparing its performance to traditional single property methods of estimating capitalization rates.

Lesson No. 8

1. describe common applications for GIS in CAMA processes of data collection, data exploration, and model building.
2. explain the main benefits of using GIS as a tool in CAMA processes.
3. appreciate the importance of close collaboration between GIS and assessment staff in the assessment office.
4. demonstrate the power of thematic maps in GIS processes to simplify complex data patterns and illustrate data issues that may otherwise be lost to the assessor.
5. describe and explain the trend to increasing integration of GIS and CAMA in the valuation process.

Lesson No. 9

1. explain in basic terms how neural networks operate.
2. use a neural network to conduct a simple real estate analysis.
3. interpret neural network output.
4. determine how to select the best neural network model to answer a given problem.
5. recognize the terms and models used in the NeuralTools application.

Lesson No. 10

1. explain the growth of CAMA systems in Canada;
2. identify the forces influencing growth of CAMA systems and barriers to adoption of regression based CAMA systems.
3. describe the latest innovative mass appraisal practices and discuss the extent of their application in CAMA systems.
4. forecast the future for the continued evolution of CAMA systems in Canada.

Resource Materials

***Required Text(s)*:**

UBC Real Estate Division. (2007). *Computer assisted mass appraisal course workbook.* (BUSI 444). Vancouver, BC: Real Estate Division, Sauder School of Business, University of British Columbia.

SPSS software disk.

***Reference Text(s)*:**

UBC Real Estate Division. (2003). *Real property assessment*. Vancouver, BC: UBC Real Estate Division.

Conduct of Course

Since AP444 is course BUSI 444 in the diploma program in Urban Land Economics at the University of British Columbia, contents of the course workbook are followed.

AP444 is one of the five courses required in the Certificate program in Real Property Assessment at the University of British Columbia Real Estate Division.

AP444 is an advanced applied statistical computer lab/lecture course in which students continue to use the statistical software called SPSS and work on their own laptops. The course evaluation consists of chapter multiple choice assignments, three projects that apply the basics of computer mass appraisal modeling to the appraisal and assessment industries and a final take-home Case Study examination.

The final project, developed by the University of British Columbia, is the Comprehensive Take Home Case Study Version. One resubmission of the case study is permitted (as per the regulations in the handbook).

Classroom participation concerning class material is expected and is beneficial to all students. Practice classroom courtesy so that class discussion periods can be conducted in an orderly fashion. If you must enter the classroom after class has begun, please do so as quietly as possible. If you have a continuing disagreement with the instructor on a particular graded exercise or exam question, please see the instructor after class or during office hours.

Studying for the course: it is critical that each student read the assigned material for each class and keep up to date with all lectures, computer work and assignments.

Student counseling: students who are experiencing difficulty with the course should immediately consult the instructor during office hours or by appointment.

Course withdrawal: students should familiarize themselves with the school's course withdrawal policy and procedures that are explained in the student handbook/calendar. It is important to note that students who simply discontinue attending class without officially withdrawing from the course receive a grade based upon the total points they have accumulated. Ordinarily, the result is a failing grade.

Canceled classes: on occasion classes may be canceled due to inclement weather, instructor illness, or for some other reason. These classes are rescheduled if possible. Please check and carefully read the cancellation notices posted on classroom doorways (i.e. date, time and course).

Cheating: any student observed plagiarizing materials or cheating on written assignments/projects, chapter quizzes or the final take home project are dealt with according to the procedure stipulated in the student handbook/calendar.

Evaluation Procedures

Multiple Choice Assignments	10% (in total)
Projects/Written Assignments:	
No. 1	20%
No. 2	20%
No. 3	10%
Final Examination (Case Study)	40%
Total	100%

A minimum grade of 50% (D) is required in the final examination case study.

Grade Equivalents and Course Pass Requirements

A minimum grade of D (50%) (1.00) is required to pass this course.

Letter	F	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
Percent Range	0-49	50-52	53-56	57-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	1.00	1.30	1.70	2.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

Students must maintain a cumulative grade of C (GPA - Grade Point Average of 2.00) in order to qualify to graduate.

Attendance

Regular attendance is essential for success in any course. Absence for any reason does not relieve a student of the responsibility of completing course work and assignments to the satisfaction of the instructor. Poor attendance may result in the termination of a student from a course(s).

If you do not meet the established attendance requirements, your instructor will recommend that the Registrar withdraw you from the course. A failing grade of RW (Required to Withdraw) will appear on your transcript.

In cases of repeated absences due to illness, the student may be requested to submit a medical certificate.

Instructors have the authority to require attendance at classes.

Course Units/Topics

LESSON NO. 1 - Review of Statistical Software and Valuation Modelling Basics

LESSON NO. 2 - Data Screening - Preparing Data for Modelling

LESSON NO. 3 - Land Valuation Modelling

LESSON NO. 4 - Cost-Based Modelling

LESSON NO. 5 - Sales-Based Modelling

LESSON NO. 6 - Advanced Sales-Based Modelling - Non-Linear Regression

LESSON NO. 7 - Income-Based Modelling

LESSON NO. 8 - Integrating Geographic Information Systems and CAMA

LESSON NO. 9 - Neural Network Applications in Real Estate

LESSON NO. 10 - The Canadian CAMA Experience

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