Bow Valley College

Course Outline

DATA3304

Data Analysis II
Fall 2023 - Current

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DATA3304 Data Analysis II

COURSE DESCRIPTION

Using identified relationships within the data learners build simple predictive models based on regression and classification. Learners fit the data to the model, assess the model's performance and make adjustments the model's parameters. Learners summarize the outcome(s) of their analysis from predictive models and use the outcome(s) to develop actionable business insights. Learners assess further modelling opportunities and make recommendations for further data analysis. Additional Performance Standards: This course, along with Data Analysis, make up the Performing Data Analysis competency; competency assessments in both courses must be successfully completed to be deemed competent.

REQUISITES	None
EQUIVALENTS	None
CREDITS	3
HOURS	45
ELIGIBLE FOR PLAR	No
ZERO TEXTBOOK COST	No

COURSE COMPETENCY

COMPETENCY TITLE

Data Management and Analytics – Performing Data Analysis

COMPETENCY STATEMENT

Data Management and Analytics professionals are able to identify, analyze, and interpret patterns in complex and expansive datasets in order to extract business-relevant and actionable insights.

COMPETENCY DESCRIPTION

Data analysis is the process of deriving meaning from data to help organizations make quality decisions. In order to meet project objectives, data analysts apply a range of techniques to identify meaningful patterns in data and apply their knowledge and skills to ascertain the nature of those patterns and relationships to explain past observations or make predictions about future outcomes. Competent learners will be able to apply both manual and machine-learning approaches to identifying, characterizing, and evaluating relationships that exist in datasets in order to illustrate existing situations or to build simple predictive (supervised learning) models, translating results into actionable, evidence-based business insights.

COURSE LEARNING OUTCOMES

Bow Valley College is committed to ensuring our graduates can demonstrate their abilities in key areas that will make them effective citizens and encourage their development as lifelong learners. In addition to the discipline-specific skills that learners acquire in their programs, the College has identified ten learning outcomes.

College-Wide Outcomes:

1. Communication
2. Thinking Skills
3. Numeracy and Financial Literacy
4. Working with Others
5. Digital Literacy
6. Positive Attitudes and Behaviours
7. Continuous Learning
8. Health and Wellness Awareness
9. Citizenship and Intercultural Competence
10. Environmental Sustainability

#	COURSE LEARNING OUTCOME(S)	COLLEGE WIDE OUTCOMES SUPPORTED
1	Understand and apply supervised (predictive) learning for data modeling and prediction tasks.	1, 2, 3, 5, 6
2	Construct data visualizations utilizing python coding techniques.	2, 3, 4, 5
3	Apply various unsupervised learning methods such as clustering and dimensionality reduction.	2, 3, 4, 5
4	Understand the concept of overfitting and apply techniques such as regularization and cross-validation to mitigate the issue.	2, 3, 4, 5
5	Understand importance of effective report writing and presenting skills and apply them in professional and academic settings.	1, 2, 4, 5, 6, 9, 10

LEARNING PATHWAY

**The time it takes learners to demonstrate competencies will vary. An example of a suggested schedule for learning and development is shown below. Learners will need to plan out their assessment attempts within their course. For additional information, please consult the Course Offering Information in Brightspace.*

WEEK/HOURS	LEARNING AND DEVELOPMENT PLAN
Week 1	Review performance demonstration and learning pathway
Week 2	Create Success Plan - Begin working on identifying models based on target relationship (s) and objective
Week 3	Write model statements and functions
Week 4	Building linear regression models
Week 5	Building classification models
Week 6	Building classification models
Week 7	Feature scaling and overfitting
Week 8	Controlling for complexity/overfitting
Week 9	Reading Week
Week 10	Fit models using training data
Week 11	Run model(s) on test data
Week 12	Calculate quality of fit - Refine model performance
Week 13	Summarize predictive analysis
Week 14	Develop actionable business insights from analysis - Recommend further analysis
Week 15	Complete performance demonstration

COURSE MODULES AND SCHEDULE

**Course schedule subject to change, depending on delivery mode and term of study. For exact dates, please consult the Course Offering Information in Brightspace.*

WEEK/HOURS	MODULES
1	Introduction: data - analytic thinking
2	Introduction to predictive analytics: data attributes and information gain
3	Introduction to predictive analytics: data attributes and information gain
4	Fit a model to data
5	Fit a model to data
6	Fit a model to data
7	Overfitting and its avoidance
8	Similarity, neighbors and clusters
9	Reading week
10	Similarity, neighbors and clusters
11	Similarity, neighbors and clusters
12	Model evaluation
13	Visualize model performance
14	Evidence and probabilities
15	Final group presentation

ASSESSMENT

This course follows an assessment-first approach, in which learners will be assessed, and receive structured feedback, and a personalized learning plan. Learners will also receive differentiated support from an instructor based on their individual needs.

Learners will have a variety of ways to demonstrate they have met the required competency through the demonstration of learning outcomes and criteria as laid out in the rubric. Learners will have multiple (but not unlimited) attempts to prove competency. It is suggested that learners plan out their assessment attempts within their course.

Learners will have flexibility in how they satisfy course learning outcomes while still adhering to the criteria found in the rubric and the Course Offering information. Please refer to the Course Offering Information and the rubric in Brightspace for additional information.

COURSE LEARNING OUTCOMES	ASSESSMENT
1	Performance Demonstration

ASSESSMENT

COURSE LEARNING OUTCOME(S)	ASSESSMENT	WEIGHT
1, 2, 3, 4	Quizzes (Minumum of 2)	20%
1, 2, 3, 4, 5	Assignments (Minumum of 4)	50%
1, 2, 3, 4, 5	Final group project and presentation	30%

Important: For details on each assignment and exam, please see the Course Offering Information.

PERFORMANCE STANDARDS

A minimum grade of D is required to pass this course. However, a program may require a higher grade in this course to progress in the program or to meet specific program completion requirements.

Please consult with the program area or contact the program chair for further details. A minimum Grade Point Average of 2.0 is required for graduation.

GRADING SCHEME

Grade	**Percentage**	**Grade Point**	**Description**
A+	95-100	4.0	Exceptional: superior knowledge of subject matter
A	90-94	4.0	Excellent: outstanding knowledge of subject matter
A-	85-89	3.67	
B+	80-84	3.33	
B	75-79	3.0	Very Good: knowledge of subject matter generally mastered
B-	70-74	2.67	
C+	67-69	2.33	

C	64-66	2.0	Satisfactory/Acceptable: knowledge of subject matter adequately mastered
C-	60-63	1.67	
D+	57-59	1.33	
D	50-56	1.0	Minimal Pass
F	Less than 50	0.0	Fail: an unsatisfactory performance

REQUIRED LEARNING RESOURCES

Provost, F., & Fawcett, T. (2013) *Data science for business: What you need to know about data mining and data-analytic thinking*. O'Reilly Media, Inc.

ISBN: 9781449361327 print

ISBN: 9781449374297 ebook

Additional learning resources may be found in the Course Offering Information or in Brightspace.

ADDITIONAL INFORMATION

The Performing Data Analysis competency makes up part of the Data Management and Analytics job profile along with:

- Designing Data Projects
- Acquiring and Wrangling Data
- Visualizing and Presenting Insights

Additional information may be found in the Course Offering Information or in Brightspace.

ACADEMIC ACCOMMODATIONS

Learners with a disability (learning, physical, and/or mental health) may qualify for academic and exam accommodations. For more information, or to apply for accommodations, learners should make an appointment with Accessibility Services in the Learner Success Services (LSS) Department. Accessibility Services can also assist learners who may be struggling with learning but do not have a formal diagnosis. To make an appointment visit LSS on the first floor of the south campus or call 403-410-1440. It is the learner's responsibility to contact Accessibility Services and request academic accommodations. For more information, please visit our website at http://www.bowvalleycollege.ca/accessibility.

INSTITUTIONAL POLICIES

Bow Valley College is committed to the highest standards of academic integrity and honesty. Learners are urged to become familiar with and uphold the following policies: Academic Integrity (500-1-7), Learner Code of Conduct, Procedures and Guidelines (500-1-1), Learner Appeals (500-1-12), Attendance (500-1-10), Grading (500-1-6), Academic Continuance and Graduation (500-1-5), and Electronic Communications (300-2-13). Audio or video recording of lectures, labs, seminars, or any other teaching and learning environment by learners is allowed only with consent of the instructor as part of an approved accommodation plan. Recorded material is to be used solely for personal study and is not being used or distributed without prior written consent from the instructor.

Turnitin:

Students may be required to submit their course work to Turnitin, a third-party service provider engaged by BVC. Turnitin identifies plagiarism by checking databases of electronic books and articles, archived webpages, and previously submitted student papers. Students acknowledge that any course work or essays submitted to Turnitin will be included as source documents in the Turnitin.com reference database, where it will be used solely to detect plagiarism. The terms that apply to a student's use of Turnitin are described on Turnitin.com.

Online Exam Proctoring:

Examinations for this course may require proctoring through an online proctoring service. Online proctoring enables online exam taking within a controlled and monitored environment, thereby enhancing academic integrity. Online proctoring may occur through a variety of methods, including but not limited to:

a. live online proctoring where a remote invigilator authenticates identity and observes completion of an exam using specialized software and recordings;
b. automated proctoring where the exam session is recorded and AI (artificial intelligence) analyzed;
c. browser lockdown that limits access to other applications, websites, copying, printing, screen capture and other functions; or
d. a combination of both live/automated proctoring and browser lockdown.

Course instructors will review recordings, analyses, and data obtained through online proctoring for academic integrity infractions. It is the student's responsibility to meet the technical, software, location, and identity verification requirements necessary to enable online proctoring.

Further details of these policies are available in the Academic Calendar and on the Bow Valley College website, bowvalleycollege.ca.

Learners are encouraged to keep a copy of this course outline for future reference.

Collection of Personal Information:

This course, including your image and voice, may be recorded and made available to you and other students taking the course section. By attending the class(es) online or in person, you consent to the collection of your personal information. If you do not wish to be recorded, please contact your instructor before starting the course/class to discuss alternative arrangements.

You may use the recordings only for educational purposes and you must not copy, share, or use the recordings for any other purpose without the instructor's express permission.

Your personal information is collected in accordance with section 33(c) of the Freedom of Information and Protection of Privacy Act (Alberta) to deliver academic programming, support learner flexibility, promote universal design for learning principles, and for purposes consistent with the course activities and outcomes. If you have any questions about the collection, disclosure, use, or protection of this information, please contact the College's Access and Privacy Officer at foip@bowvalleycollege.ca.