



OFFICE OF THE VICE-PRESIDENT, ACADEMIC AND PROVOST

8888 University Drive, Burnaby, BC
Strand Hall | 3100
Canada V5A 1S6

TEL: 778.782.5731
FAX: 778.782.5876

vpacad@sfu.ca
www.sfu.ca/vpacademic

MEMORANDUM

ATTENTION	Senate	DATE	June 3, 2021
FROM	Catherine Dauvergne, Vice-President, Academic and Provost and Chair, SCUP	PAGES	1 of 1
RE:	Full Program Proposal for a Graduate Certificate in Business Analytics (SCUP 21-21)		

At its June 2nd, 2021 meeting, SCUP reviewed and approved the Full Program Proposal for a Graduate Certificate in Business Analytics.

Motion:

That Senate approve and recommend to the Board of Governors the Full Program Proposal for a Graduate Certificate in Business Analytics within Beedie School of Business, effective Spring 2022.

For Information:

The program name was originally submitted to SGSC as Graduate Certificate in Data and Analytics. It was subsequently modified during the June 2nd SCUP meeting to read Graduate Certificate in Business Analytics as the result of SCUP feedback.

Included in the full program proposal and approved by SCUP subject to approval by Senate:

1. New calendar entry: Graduate Certificate in Business Analytics
2. New courses: BUS 786 Data Science for Business

C: A. Gemino



Simon Fraser University
Maggie Benston Centre 1100
8888 University Drive
Burnaby, BC V5A 1S6

TEL 778.782.3042
FAX 778.782.3080

gradstudies@sfu.ca
www.sfu.ca/grad

MEMORANDUM

ATTENTION	Senate Committee on University Priorities (SCUP)	DATE	May 21, 2021
FROM	Jeff Derksen, Chair of Senate Graduate Studies Committee (SGSC)		
RE:	Full Program Proposals : Graduate Certificate in Data and Analytics		

For approval:

At its meeting on May 4, 2021, SGSC approved the full program proposal for a Graduate Certificate in Data and Analytics from the Beedie School of Business and is recommending it to SCUP for approval, effective **Spring 2022**.

Motion:

That SCUP approve and recommend to Senate the full program proposal for a Graduate Certificate in Data and Analytics within the Beedie School of Business, effective Spring 2022.

For Information:

Included with the full program proposal and approved by SGSC subject to approval by Senate:

- 1) New calendar entry: Graduate Certificate in Data and Analytics.
- 2) New Course: BUS 786 Data Science for Business



Memo to SGSC

To: Senate Graduate Studies Committee
From: Andrew Gemino, Associate Dean, Graduate Programs
Re: Calendar and Curriculum Changes for Spring 2022
Date: April 7, 2021

The following calendar and curriculum revisions have been approved by the Beedie School of Business and are being forwarded to the Senate Graduate Studies Committee for approval. These program changes should be effective for **Spring 2022**.

Please include the following on the next SGSC agenda.

Graduate Certificate in Data & Analytics

- **New Program Proposal: Graduate Certificate in Data Analytics**
- **New Graduate Course Proposal: BUS 786**

Graduate Certificate in Digital Innovation

- **New Program Proposal: Graduate Certificate in Digital Innovation**

Thank you for your attention herein. Should you have any questions or concerns, please do not hesitate to contact me.

Dr. Andrew Gemino
Associate Dean, Graduate Programs
Beedie School of Business



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Graduate Certificate in Business Analytics

Full Program Proposal

April 20, 2021

Beedie School of Business

Executive Summary

Digital building block skills including data and analytics are “critical to many vocations, and increasingly useful outside traditional digitally intense job families” according to a 2018 report by Burning Glass¹ on the new foundational skills needed in the workforce.

Data and analytics skills enable individuals to adapt to and leverage new levels of data in order to thrive in the digital economy. Therefore, this program targets students and professionals, including workers who wish to reskill into the field of analytics and recent graduates from a variety of academic backgrounds who will gain skills in data and analytics, thus applying this knowledge within their respective fields and organizations.

PART A [3 pages maximum]

Proposed credential to be awarded

Graduate Certificate in Business Analytics

Location of program

Burnaby

Academic unit(s) offering proposed program

Beedie School of Business

Anticipated program start date

Spring 2022

Anticipated completion time

Two Terms

Summary of proposed program

a) Aims, goals and/or objectives of the proposed program

This certificate program is being proposed to educate participants in the data and analytics skills needed for the future of work. These skills include managing and analyzing data, visualizing data and a foundational level of digital fluency. A key learning outcome for the program is for participants to know how to translate data for decision making purposes.

With an increased need to be ‘analytics translators’ or digitally knowledgeable to a level where individuals can produce what organizations are after, this certificate program aims to fill this skills gap.

b) Anticipated contribution of the proposed program to the mandate and strategic plan of the institution

The Graduate Certificate in Business Analytics aligns with the mandate of the institution

¹ Burning Glass, The New Foundational Skills of the Digital Economy: Developing the Professionals of the Future (2018). Retrieved from: https://www.burning-glass.com/wp-content/uploads/New_Foundational_Skills.pdf

as well as the Beedie School of Business's calling through a focus on innovation, collaboration, and data and analytics.

It also aligns with SFU's Academic Plan 2019-24 by addressing the following challenges:

- Student life, learning and success: participants learn how to use the latest analytics tools and adapt the use of these tools into the workplace.
- Academic Quality/Curriculum: timely and innovative program curriculum combined with blended delivery including online and face-to-face programming.
- Engagement: with the skills learned in the certificate, students add value to their organizations and/or have the skills necessary to meet gaps in the labour market in the coming years.
- Bridging Divides: the program integrates data and analytics across professions to address the need for this knowledge and to advance professionally.
- Faculty Renewal: the program provides opportunities for faculty to further develop graduate program/course design and instructional skills as well as increasing the tuition revenue to support the faculty complement.

c) Potential areas/sectors of employment for graduates and/or opportunities for further study.

The potential opportunities for graduates of this program include career progression and pathways to new career opportunities. The Burning Glass report outlines that although these skills frequently stem from digitally intensive areas of the economy, demand for these skills go beyond the tech economy. Also, these types of digital skills will increase earning power and productivity of employees and have the ability to boost salary ranging from 7% to 38% higher than average.

Graduates can continue their studies in other diploma or master's programs, such as a Master of Business Administration, to gain general business knowledge while having specialized knowledge in the area of data and analytics.

d) Delivery methods

The Graduate Certificate in Business Analytics will be offered using a cohort model and a blended education delivery approach. That is to say that all course work will include asynchronous and synchronous components in the form of face-to-face sessions supported by an online learning management system, Canvas. This blended model helps to engage students and increase learning retention.

e) Related programs in the institution or other British Columbia post-secondary institutions.

Related programs in B.C. include SFU Beedie's Graduate Certificate in Accounting with Digital Analytics, the Graduate Certificate in Data Analytics from Athabasca University, the Graduate Certificate in Business Analytics from BCIT, and the UBC Master of Business Analytics. Most of these programs are focused on developing computing science and technical skills for data scientists rather than data and analytics in a business context. Additionally, the broad skills taught in the Graduate Certificate in Accounting with Digital Analytics program will be leveraged for a non-accounting/non-CPA audience through this certificate offering.

Contact information

Michael Johnson, Senior Lecturer, Beedie School of Business, mjohn@sfu.ca, 778.782.5559.

PART B [2 pages maximum]

PROGRAM DETAILS

a) Graduation requirements, target audience

Graduation requirements include the successful completion of a minimum of 12 units of course work to receive a Graduate Certificate in Business Analytics credential. The certificate program will initially target a cohort of individuals interested in exploring graduate education offerings (recent graduates from post-secondary who want to transition into the workforce) with the intention of expanding to include future cohorts of current employees at organizations.

The program can grow to be offered in concurrent terms and to a broader audience through the blended learning format. The Beedie School of Business is looking into the steps needed to create a non-credit to credit pathway for this certificate through an advance credit arrangement, and to integrate the certificate into other graduate program requirements (such as the MBA) to award additional credentials in a specialized area for these students. An expansion of the target audience for the program would aim at “those who seek to thrive in the digital economy” and those who wish to get their foot in the door as suggested in The New Foundational Skills report from Burning Glass.

b) Admission requirements

Applicants must satisfy the University admission requirements as stated in the Graduate General Regulations 1.3 in the SFU Calendar. Applicants should normally have an undergraduate degree with a minimum 3.0 cumulative grade point average.

c) Evidence of student interest and labour market demand

An RBC Future Skills Report², references a Brooks Institution study that found that “71 percent of U.S. jobs now require medium or high amounts of digital skills, up from 45 percent between 2002 and 2016... The percentages may vary in Canada, but the trend will not”. Many companies are hiring young workers who are digitally literate and analytical which are skills that weren’t prioritized in the past.

Graduates of the program would be positioned for roles in data analytics such as analytics translators or data visualization analysts as these roles aim to bridge the gap between those who create the data and those that are invested in the results of the data. Therefore, most careers graduating students will be able to compete for in the job market include analyst roles included in: financial and investment analysts (NOC 1112) and database analyst and data administrators (NOC 2172).

Furthermore, the Burning Glass “New Foundational Skills of the Digital Economy: Developing the Professionals of the Future” report, mentioned previously, outlines that there will be “explosive demand across multiple sectors for people who can synthesize

² Royal Bank of Canada, Humans Wanted: How Canadian Youth Can Thrive in The Age of Disruption. 2018. Retrieved from: <https://www.rbc.com/dms/enterprise/futurelaunch/assets-custom/pdf/RBC-Future-Skills-Report-FINAL-Singles.pdf>

multiple skills that include a digital or technical element”. The digital skills needed “are especially useful to current or aspiring functional analysts and data-driven decision makers”.

d) Eligibility for scholarships, awards, and financial aid

Certificate students will not be eligible for internal scholarships, awards, or financial aid. However, students may be eligible for external and donor funded scholarships, awards, and financial aid, so long as they meet the eligibility criteria.

RESOURCES

a) Enrolment Plan

SFU Beedie plans to offer this certificate to those wanting graduate education in the area of data and analytics. The certificate will be available to individuals as well as those who have successfully completed the non-credit equivalent in the first year. The anticipated student enrolment for 2022 is expected at 20 students per cohort with a minimum viable cohort size of approximately 15 students. The minimum viable cohort size includes an analysis of direct, administrative and faculty costs.

Within the next three years, we expect to maintain a 20-student cohort. With an expanded target market to include the addition of the certificate being offered to other graduate program cohorts (such as the MBA) in 2022/23 we anticipate one additional cohort may be necessary. Therefore, we expect that the number of credentials awarded 2021/22 through to 2023/24 would be 20, 20, 40 respectively.

b) Resources required and/or available to implement the program (financial and personnel) including any new faculty appointments

The resources required for the program include additional staff and faculty. Additional staff will be supported by the share of tuition provided by SFU to the program and startup costs will be covered by the Beedie School of Business as an investment that will be recovered through tuition revenue. Additional instructional costs will be covered by new faculty and temporary instructors. These additional faculty costs, including benefits, will also be covered by a share of tuition but only in cohorts larger than 15.

c) Faculty member’s teaching/supervision

Numerous faculty members from our Management and Information Systems, Accounting and Finance areas would be ideal to teach in this certificate program offering.

Teaching loads will initially be impacted as SFU Beedie continues to push to recruit more faculty over the next few years as indicated in Beedie’s 2018-2023 Five-Year Academic Plan. After which, this certificate will provide opportunities for faculty to further develop graduate instructional skills as well as increasing tuition revenue to support the faculty complement.

d) Proposed tuition and other program fees including a justification

The proposed tuition fees are \$721.87 per unit, plus additional student fees as per the academic calendar. This per unit fee aligns with existing Graduate Certificate tuition within the Beedie School of Business including the Graduate Certificate in Science and

Technology Commercialization and the Graduate Certificate in Accounting with Digital Analytics. The total program fees will be \$8,662.44 per student.

Please note that this per unit fee will be charged to everyone except those whose home program charges a per term fee and if completing the certificate is part of their home program requirements.



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APPENDIX 1

Calendar Entry

Business Analytics

Graduate Certificate

Description of Program

The Graduate Certificate in Business Analytics features programming in the quantitative digital building block skills needed in the workforce such as articulating data requirements and processes, and using analytic, statistical and visualization techniques. This program is for aspiring functional analysts and data-driven decision makers.

Admission Requirements

Applicants must satisfy the University admission requirements as stated in [Graduate General Regulation 1.3](#) in the SFU Calendar. For more information, please contact the Beedie School of Business

Program Requirements

This program consists of course requirements for a minimum of 12 units. Course work may be substituted at the discretion of the academic director.

Students must complete all of

BUS 830 – Data Management and Business Solutions (3)

BUS 831 – Analyzing and Visualizing Business Data (3)

BUS 786 – Data Science for Business (3)

BUS 721 – Special Topics (3)

Program Length

Students are expected to complete the program requirements within two terms.

Academic Requirements within the Graduate General Regulations

All graduate students must satisfy the academic requirements that are specified in the [graduate general regulations](#), as well as the specific requirements for the program in which they are enrolled.



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APPENDIX 2

New Courses

New Graduate Course Proposal

Course Subject (eg. PSYC)	Number (eg. 810)	Units (eg. 4)
Course title (max. 100 characters)		
Short title (for enrollment/transcript - max. 30 characters)		
Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description)		
Rationale for introduction of this course		
Term of initial offering (eg. Fall 2019)	Course delivery (eg. 3 hrs/week for 13 weeks)	
Frequency of offerings/year	Estimated enrollment per offering	
Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)		
Prerequisite and/or Corequisite		
Criminal record check required? ☐ Yes if yes is selected, add this as prerequisite		Additional course fees? ☐ Yes ☐ No
Campus where course will be taught ☐ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus		
Course Components * ☐ Lecture ☐ Seminar ☐ Lab ☐ Independent ☐ Capstone ☐ _____		
Grading Basis ☐ Letter grades ☐ Satisfactory/ Unsatisfactory ☐ In Progress / Complete		
Repeat for credit? ☐ Yes ☐ No	Total repeats allowed? _____	Repeat within a term? ☐ Yes ☐ No
Required course? ☐ Yes ☐ No	Final exam required? ☐ Yes ☐ No	Capstone course? ☐ Yes ☐ No
Combined with a undergrad course? ☐ Yes ☐ No If yes, identify which undergraduate course and the additional course requirements for graduate students:		

* See important definitions on the curriculum website.

RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course
Additional faculty members, space, and/or specialized equipment required in order to offer this course

CONTACT PERSON

Academic Unit / Program	Name (typically, Graduate Program Chair)	Email
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ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee	Signature	Date
Department Chair	Signature	Date

FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done? ☐ YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee	Signature 	Date
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A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee	Signature 	Date
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ADMINISTRATIVE SECTION (for DGS office only)

Library Check: _____
Course Attribute: _____
Course Attribute Value: _____
Instruction Mode: _____
Attendance Type: _____

If different from regular units:
Academic Progress Units: _____
Financial Aid Progress Units: _____

BUS 786: Data Science for Business

Course Description

This course covers business applications of data science tools like data wrangling, data analytics and visualization in areas such as marketing, human resources and operations management. Through a hands-on approach, students will learn various Python packages and Jupyter notebooks and how to use these tools to execute relevant data science techniques on complex data with a special focus on natural language processing, which is essential to understanding various textual information collected through various business processes. The course starts with the basics of programming using python for data processing, cleaning and manipulation. Next, the course investigates the use of python for data acquisition through web scraping techniques to further enhance both programming and data science understanding. The course will introduce data manipulation and cleaning techniques using the popular python pandas data science library as well as other libraries for data processing, modeling, and visualization. By the end of this course, students will be able to capture data from online data sources, apply data wrangling steps for cleaning, reshaping and manipulation to derive business understanding through inferential statistical analyses and visualization. This course also covers the Python libraries NumPy, Pandas, and Matplotlib, which are indispensable tools for doing data analysis in Python.

Objectives

By the end of this course, students will:

- Understand the basic process of data science
- Develop moderate level programming skills in Python and Jupyter notebooks
- Have an applied understanding of how to clean, reshape, manipulate and analyze datasets
- Be proficient in the use of a collection of open-source tools to analyze data including Python, Jupyter notebooks, pandas, Matplotlib, git, NumPy, scikit-learn and NLTK.
- Apply basic and inferential statistical analysis and visualization methods using advanced programming tools
- Communicate findings through individual and team-based exercises bridging technical and analytic skill sets

Subjects/Topics

In each module students will have a knowledge-based and practical component. The knowledge-based components are listed below. The practical components will have students complete programming tasks for applied understanding.

Module 1: Defining data science for business.

Module 2: Fundamentals of Data Manipulation with Python.

Module 3: Jupyter Notebooks and Numpy

Module 4: Basic Data Processing with Pandas

Module 5: Data Visualization: Investigating Questions with Dirty Data

Module 6: Web Scraping with Python

Module 7: Regression, Aggregation, and object-oriented structures with Python used in data analysis.

Module 8: Working with Text and Databases

Module 9: Introduction to Machine Learning

Module 10: Final Project

Book and Materials

1. Data Science from Scratch: First Principles with Python, 2nd Edition, By Joel Grus, 2019, O'Reilly Media.
2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking, 2013, O'Reilly Media.

Learning and Assessments

Assessment summary

Evaluation in the course will be based on a combination of group and individual work. As in all large courses in the Beedie School of Business, grading norms will be observed. In other words, students with the top marks relative to the class average will receive the top grades.

**** Please remember that as per graduate grading policies, group assignments should not add up to more than 50% of the total grade.**

Individual	Quizzes	30%
	Assignments	25%
	Peer Assessment	10%
Team	Data Science Project and Presentation	35%
	Total	100%



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APPENDIX 3

Letters of Support



December 1, 2020

Dear Prof. Andrew Gemino,

The proposed Certificate in Data and Analytics will be an important initiative to provide our workforce with essential skills. As the VP, Enterprise Analytics at Coast Capital Savings Credit Union, I am responsible for all aspects of leveraging data for the benefit of our 500K+ members. The Enterprise Analytics team is currently comprised of 30 team members with a wide variety of skills sets and in the coming few years we're going to need significant additional resourcing to meet the ever growing demand for analytics. The hands-on approach with regular assessment and feedback in these certificate courses would be instrumental in shaping future employees with the ability to develop critical business understanding and communication skills related to data and analytics.

With the advances of analytics tools such as Einstein in Salesforce, even sophisticated analytics algorithms are now widely available within organizations. The barrier to data-driven decision making is not necessarily in the technical aspects but rather in storytelling with data, namely driving action from insights. The courses in the proposed Certificate in Data and Analytics have a strong emphasis on business understanding and communication, which are essential to storytelling with data. It is critical for students, as future employees and managers, to understand that a data visualization is useless if it is not related to any key performance outcomes of the organizations. Presenting a non-data view of the business process can be necessary to build the proper context for any analytics insights, and wrangling with textual data such as customer reviews involves connecting with cross-functional stakeholders throughout the organization.

Collaborative, detail-oriented, creative thinkers with excellent analytical and problem-solving skills are essential in elevating our customer experience and product usage. Hiring employees with a combination of business management, communication, and data-driven skillsets via the proposed Certificate in Data and Analytics is an attractive addition to Coast Capital Savings. These skills are in short supply in the local market and in order to maintain our long-term competitiveness I look to our partners in the education system to help develop programs that will meet these needs.

Sincerely,

A handwritten signature in dark ink, appearing to read 'JC' followed by a stylized flourish.

Jeremy Coughlin,
VP Enterprise Analytics
Coast Capital Savings



FACULTY SCIENCE
Statistics & Actuarial Science

SC K10545

8888 University Drive, Burnaby, BC
Canada V5A 1S6

TEL 778.782.3803

FAX 778.782.4368

www.stat.sfu.ca

November 26, 2020

Dear Prof. Andrew Gemino,

I am writing to support the proposed Certificate in Data and Analytics. As Academic director for the rapidly growing data science major at Simon Fraser University, I have carefully watched the data and analytics field evolve over the past few years.

This field has seen several important trends, such as the separation/specialization of roles in data engineering and in data science. One important trend is the rise of analytics translators, a role McKinsey & Company started using recently to refer to the individuals “bridging the technical expertise of data engineers and data scientists with the operational expertise of marketing, supply chain, manufacturing, risk and other frontline managers”. These analytics translators are the key to unlocking the impacts of any data science projects in all organizations. McKinsey estimated in 2016 that 20 to 40 percentage of the graduates in business and in the STEM fields of science, technology, engineering and mathematics in the next decade have to go into these business translator roles to meet the demand. The number in the U.S. currently sits at only 10%, and the Canadian situation is not expected to be any better.

The proposed Certificate in Data and Analytics will be an important platform to help STEM graduates transition into these in-demand analytics translator roles. Specifically, while the courses cover technical concepts and tools such as natural language processing in python and data warehouse design, the focus on business context and communication make them essential to students who aspire to gain employment in the emerging role of analytics translators.

Sincerely yours,

A handwritten signature in black ink that reads "Jiguo Cao".

Jiguo Cao, PhD
Canada Research Chair in Data Science
Professor, Department of Statistics and Actuarial Science
Director of the Data Science Undergraduate Program
Simon Fraser University
Burnaby, BC, Canada
Email: jiguo_cao@sfu.ca
Tel: (+1) 778 - 782 - 7600
Homepage: <https://www.sfu.ca/science/stat/cao/>

Nov 27th, 2020

Dear Andrew,

The proposed graduate certificate in Data & Analytics will address an important skill gap in the big data and business analytics market, in which IDC in 2019 predicted companies and organizations around the world to spend US\$274 billion by 2022 with a five-year CAGR of 13.2% (The recent pandemic is probably going to accelerate the growth).

Given the increasing importance of data and analytics in our economies and societies, there are abundant options for keeners to learn data visualization and machine learning algorithms. However, the technical competence is only a necessary but insufficient condition to becoming data-driven decision makers or analytics professionals. For example, in a 2017 survey of analytics professionals by Kaggle, among the top seven barriers and challenges facing the respondents are “Company politics / Lack of management/financial support for a data science team”, “The lack of a clear question to be answering or a clear direction to go in with the available data”, “Data Science results not used by business decision makers” and “Explaining data science to others”

In my years teaching an undergraduate business analytics capstone project course and hosting a student business analytics hackathon, many industry partners and analytics leaders have been echoing the same tune: business understanding, process management and communication are as important as, if not more important than, the technical competence. A cutting-edge machine learning algorithm trained with the best available data is a failure if it does not move the driver metrics of the business, exceeds the time and resource constraints, and/or earns no trust from any stakeholders. The emphasis of the proposed Data & Analytics certificate on this strategic side of data and analytics would surely fill this important skill gap.

Being an incoming graduate program academic director, I strongly believe the proposed certificate will be a great addition for aspiring data-driven business decision makers and business analytics professionals to develop essential skills and experiences.

Sincerely,



Jason Y. C. Ho, Ph.D.
Associate Professor
Beedie School of Business
Simon Fraser University

Hi Andrew

Thank you for reaching out to me on this issue. From the perspective of the Big Data Hub, which is a university core facility, I am indeed OK with the name and content in the proposal for a Graduate Certificate in Business Analytics, which I see is a “for credit” academic program that would be developed and delivered by an academic unit.

I see great opportunities for students in the proposed program to be able to interact with our core facility.

Cheers

Fred

Fred Popowich, PHD

Scientific Director | SFU's Big Data Hub

Simon Fraser University | Applied Sciences Bldg 10905

8888 University Dr., Burnaby, B.C. CANADA V5A 1S6

T: 778.782.4883 | M: 604.803.7319 | sfu.ca/big-data

[Facebook](#) | [Twitter](#)

