Title (Units): **GFQR1027 Data Analytics Skills for Your Future Workplace (3,1,2)**

Course Aims: Knowledge of analytics and computer skills are among the top essential attributes that employers seek on a candidate's resume. This course aims to equip students with these skills that will be essential for future workplaces. This course adopts a project-based approach. The project starts with a design workshop to identify a daily life problem and design a solution for it. For sound reasoning, students will go through the data analytics process in projects. Via projects, students will learn how to collect data, arrange data into meaningful patterns, analyse data to provide useful insights, and present data in a clear and persuasive way so as to support sound reasoning and use data to convince their audience. Students will also learn related analytics skills, practical skills and software tools throughout the data analytics process. In all, on the knowledge side, this course aims to give students an overview of the role and importance of data in economic activity and real life situations; introduce to students the basic data analytics methods; help students recognize the value and limitations of quantitative data; and raise students' concern over the security and ethical issues in data handling. On the practical side, this course aims to equip students with practical and software skills to make use of quantitative data effectively to support sound reasoning in daily life and workplaces. After completing this course, students will be able to identify data requirements, use software tools to collect data, process and analyse data, visualize and present data for effective communication.

Prerequisite: Nil

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Apply basic data analytics concepts to analyse, interpret, understand and draw conclusions from quantitative data.
2	Recognize the value and limitations in quantitative data as well as the security and ethical issues in data handling.
	Skill
3	Apply basic data analytics skills (e.g. formulas, graphs, etc.) to model and solve real-life problems.
4	Apply a design methodology to perform data analytics (identify data requirements, collect and process data, interpret and analyse data, visualize and present quantitative data for effective communication) to produce data products in order to support sound reasoning in real-life issues.

Calendar Description: Knowledge of analytics and computer skills are among the top essential attributes that employers seek on a candidate's resume. This course aims to equip students with these skills that will be essential for future workplaces. This course adopts a project-based approach. Students will identify a daily life problem and go through the data analytics process in projects. Via the project, students will learn how to collect data, arrange data into meaningful patterns, analyse data to provide useful insights, and present data in a clear and persuasive way so as to support sound reasoning and use data to convince their audience. Students will also learn related analytics skills, practical skills and software tools throughout the data analytics process. In all, on the knowledge side, this course aims to give students an overview of the role and importance of data in real life situations; introduce to students the basic data analytics methods; help students recognize the value and limitations of quantitative data; and raise students' concern over the security and ethical issues in data handling. On the practical side, this course aims to equip students with practical and software skills to make use of quantitative data effectively to support sound reasoning in daily life and workplaces. After completing this course, students will be able to identify data requirements, use software tools to collect data, process and analyse data, visualize and present data for effective communication.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-2	Lectures will be given to teach various data analytics concepts, its benefits and limitations, and the underlying security and ethical issues. Theories are supported with real world examples to help students relate the concepts and techniques to real life applications. Case studies and class exercises will be given to check whether students achieve this outcome.
3	Project-based Tutorials will be given to teach students various computational and software skills to perform data analytics. Hands-on exercises will be given to students to practise the acquired skills.
4	Design thinking methodology will be used to guide groups of students to observe and identify a daily life problem, design a solution for the chosen problem, and identify the data requirements in order to produce data products to support sound reasoning in their proposed solution. The course group project is to collect data according to the data requirements identified from the Design Workshop, walk through the data analytics process to produce data products in order to support sound reasoning in the proposed solution generated from the Design Workshop for the chosen daily life problem.
1-4	The course group project is used to help students integrate the concepts and skills that they have learned in the course. Tutorial exercises will help students build up their projects piece by piece in a systematic manner.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Case Study & Tutorial Exercises	30%	1, 3	Case study will test how well students relate and apply concepts to real life situations. Tutorial Exercises are used to test how well students acquire the computational and software skills.
2	Quiz	20%	1, 2, 4	Quiz questions are designed to determine to what extent the students have achieved the expected learning outcome.
3	Group Project	40%	1-4	Project (with individual assessments) is used to evaluate how well students integrate the concepts and skills that they have learned in the course.
4	Design Workshop	10%	4	This is to encourage students to participate and interact in the transdisciplinary discussion so as to achieve ideation.

Assessment Rubrics:

Excellent (A)

- Demonstrate thorough ability to apply basic data analytic concepts to analyse, interpret, understand and draw conclusions from quantitative data.
- Demonstrate thorough ability to recognize the value and limitations in quantitative data, also the related security and ethical issues in data handling.
- Able to apply basic data analytic skills (e.g. formulas, graphs, etc.) to model and solve real-life problems with a high degree of effectiveness.
- Able to perform the process of data analytics (identify data requirements, collect and process data, interpret and analyse data, visualize and present quantitative data for effective communication) to produce data products with a high degree of effectiveness.

Good (B)

- Demonstrate sufficient ability to apply basic data analytic concepts to analyse, interpret, understand and draw conclusions from quantitative data.
- Demonstrate sufficient ability to recognize the value and limitations in quantitative data, also the related security and ethical issues in data handling.
- Able to apply basic data analytic skills (e.g. formulas, graphs, etc.) to model and solve real-life problems with a considerable degree of effectiveness.

	• Able to perform the process of data analytics (identify data requirements, collect and process data, interpret and analyse data, visualize and present quantitative data for effective communication) to produce data products with a considerable degree of effectiveness.
Satisfactory (C)	• Demonstrate some ability to apply basic data analytic concepts to analyse, interpret, understand and draw conclusions from quantitative data. • Demonstrate some ability to recognize the value and limitations in quantitative data, also the related security and ethical issues in data handling. • Able to apply basic data analytic skills (e.g. formulas, graphs, etc.) to model and solve real-life problems with some degree of effectiveness. • Able to perform the process of data analytics (identify data requirements, collect and process data, interpret and analyse data, visualize and present quantitative data for effective communication) to produce data products with some degree of effectiveness.
Marginal Pass (D)	• Demonstrate limited ability to apply basic data analytic concepts to analyse, interpret, understand and draw conclusions from quantitative data. • Demonstrate limited ability to recognize the value and limitations in quantitative data, also the related security and ethical issues in data handling. • Able to apply basic data analytic skills (e.g. formulas, graphs, etc.) to model and solve real-life problems with a moderate degree of effectiveness. • Able to perform the process of data analytics (identify data requirements, collect and process data, interpret and analyse data, visualize and present quantitative data for effective communication) to produce data products with a moderate degree of effectiveness.
Fail (F)	• Demonstrate little or no ability to apply basic data analytic concepts to analyse, interpret, understand and draw conclusions from quantitative data. • Demonstrate little or no ability to recognize the value and limitations in quantitative data, also the related security and ethical issues in data handling. • Unable to apply basic data analytic skills (e.g. formulas, graphs, etc.) to model and solve real-life problems. • Unable to perform the process of data analytics (identify data requirements, collect and process data, interpret and analyse data, visualize and present quantitative data for effective communication) to produce data products.

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Introduction to data analytics concepts	1 – 2
II	Data analytics process and its skills and software tools	3 – 4

References:

• Tech World, Data Analytics For Beginners: Practical Guide To Master Data Analytics, CreateSpace Publishing, 2017.
• Richard Dorsey, Data Analytics: Become A Master In Data Analytics, CreateSpace Publishing, 2017.
• Nataraj Venkataramanan and Ashwin Shriram, Data Privacy: Principles and Practice, Chapman and Hall/CRC, 2016.
• Michael Alexander & Dick Kusleika, Microsoft Excel 365 Bible, Wiley, 2022.
• Conrad Carlberg, Predictive Analytics: Microsoft Excel 2016 (2nd Edition), Que Publishing, 2017.
• Jason Lankow, Josh Ritchie and Ross Crooks, Infographics: The Power of Visual Storytelling, Wiley, 2013.
• Toru Ishida, Tetsuo Sawaragi, Kumiyo Nakakoji, and Takushi Sogo, Interdisciplinary Education for Design Innovation, IEEE Computer Vol.55 No. 5 pp.44-52, 2017.

Course Content:

Topic

I. Introduction to data analytics concepts
   A. What are data, and why are they important?

B. Different types of data analytics
C. How to collect data: online data sources and survey
D. How to select useful samples and avoid bias?
E. Descriptive and predictive analytics to support decision-making
F. How to present data in an appealing and persuasive way?
G. Security and ethical issues in data handling
H. Benefits and Limitations of data analytics

II. Data analytics process and its skills and software tools
A. Design thinking methodology
B. Data requirement identification to support sound reasoning in a daily life scenario
C. Data collection (online research and survey)
D. Data cleaning and processing
E. Data modeling and analysis
F. Data visualization for effective communication
G. Data communication and presentation