Title (Units): **ITEC3015 Web Development for Data Storytellers (3,2,1)**

Course Aims: This course is designed to teach students how to use web development technologies to create compelling data-driven stories for the web. Students will learn how to design and build interactive and visually engaging data visualizations, as well as how to use web technologies to tell compelling stories with data.

Prerequisite: COMP1005 Essences of Computing or
COMP1007 Introduction to Python and Its Applications or
COMP1015 Computing for Creatives I or
COMP1025 Coding for Humanists or
ITEC1015 Computing for Creatives I

Anti-requisite: ITEC2016 Data-Driven Visualization for the Web

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

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Identify the fundamentals of web development, such as HTML, CSS, and JavaScript, and be able to apply these knowledge to build basic web pages and data visualizations.
2	Identify design principles for data storytelling, including data visualization and information design, and be able to apply these principles to create effective data visualizations.
	Professional Skill
3	Learn techniques for sourcing, cleaning, and transforming data, and be able to use tools like OpenRefine and Python to prepare data for visualization.
4	Create dynamic, animated data visualizations using tools like D3.js, Chart.js and GSAP (GreenSock Animation Platform), designing user-friendly interactive experiences.
5	Identify server-side scripting languages and frameworks for dynamic web development, and be able to build dynamic web pages that respond to user input.
	Attitude
6	Be open-minded and innovative when telling stories with data. Explore how data storytelling can drive social change and use best practices for impactful and creative work.

Calendar Description: This course is designed to teach students how to use web development technologies and techniques to create compelling data-driven stories for the web. Students will learn how to design and build interactive and visually engaging data visualizations, as well as how to use web technologies to tell compelling stories with data.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1 - 2	Lectures: The lectures will provide students with theoretical knowledge on web development and data storytelling. The lectures will cover topics such as the principles of web design, the use of data visualization techniques, and the effective use of storytelling in data-driven narratives.
1, 3 - 5	Hands-on coding exercises: Students will engage in hands-on coding exercises to build web pages and data visualizations using HTML, CSS, and JavaScript. These exercises will be supplemented with review and feedback to facilitate learning and collaboration.
3 - 6	Group projects: Students will work in groups to apply their skills and knowledge to real-world data storytelling projects, such as creating interactive data visualizations or using data to drive social change. This will allow them to explore advanced techniques and best practices while developing their collaboration and project management skills.
2, 6	Tutorial: The course will include tutorials on innovative data storytelling techniques and projects, providing students with inspiration and insight into real-world applications of their skills. This will be supplemented with reflection and discussion on best practices for data

	visualization and storytelling, allowing students to develop a critical and open-minded attitude towards their work.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Coding Assignments	30%	1, 3 - 5	Students will complete coding assignments that demonstrate their proficiency in web development and data visualization using HTML, CSS, and JavaScript. The assignments will be reviewed by instructors for feedback and evaluation.
2	Group Project	30%	1 - 6	Students will work in groups to develop a data storytelling project that incorporates advanced techniques and best practices, such as interactive data visualization or using data to drive social change. The project will be evaluated based on its creativity, effectiveness, adherence to best practices, and the students' critical and open-minded attitude towards their work.
3	Examination	40%	1 - 5	A written exam that tests students' understanding of the fundamental concepts and techniques of web development, data visualization, and data storytelling. The exam will be designed to assess students' knowledge and comprehension of the course material.

Assessment Rubrics:

Category	Excellent (A)	Good (B)	Satisfactory (C)	Marginal Pass (D)	Fail (F)
Technical Skills	The student demonstrates exceptional proficiency in web development languages and tools, incorporating advanced techniques and best practices, and effectively applying them to a range of scenarios.	The student demonstrates good proficiency in web development languages and tools, incorporating some advanced techniques and best practices, and generally applying them effectively to most scenarios.	The student demonstrates basic proficiency in web development languages and tools, but may struggle to incorporate advanced techniques and best practices, or apply them effectively to some scenarios.	The student demonstrates poor proficiency in web development languages and tools, and does not incorporate advanced techniques or best practices, or apply them effectively to most scenarios.	The student does not demonstrate proficiency in web development languages and tools, and is unable to apply them effectively to any scenarios.
Design Principles	The student demonstrates exceptional understanding of design principles, incorporating them effectively to create visually appealing and user-friendly	The student demonstrates good understanding of design principles, incorporating them effectively to create web pages that are generally visually	The student demonstrates basic understanding of design principles, but may struggle to incorporate them effectively to create visually appealing and	The student demonstrates poor understanding of design principles, and does not incorporate them effectively to create visually appealing or	The student does not demonstrate understanding of design principles and is unable to create visually appealing or user-friendly web pages that effectively

	web pages that effectively communicate their message.	appealing and user-friendly, and effectively communicate their message.	user-friendly web pages that effectively communicate their message.	user-friendly web pages that effectively communicate their message.	communicate their message.
Data Storytelling	The student demonstrates exceptional understanding of data storytelling concepts and techniques, effectively identifying a story, selecting appropriate data, and using visualization to support the story. They effectively communicate their message to their target audience through their web pages.	The student demonstrates good understanding of data storytelling concepts and techniques, effectively identifying a story, selecting appropriate data, and using visualization to support the story. They generally communicate their message to their target audience through their web pages.	The student demonstrates basic understanding of data storytelling concepts and techniques, but may struggle to effectively identify a story, select appropriate data, or use visualization to support the story. They may struggle to communicate their message to their target audience through their web pages.	The student demonstrates poor understanding of data storytelling concepts and techniques, and does not effectively identify a story, select appropriate data, or use visualization to support the story. They do not effectively communicate their message to their target audience through their web pages.	The student does not demonstrate understanding of data storytelling concepts and techniques and is unable to effectively communicate their message through their web pages.
Critical Thinking	The student demonstrates exceptional critical thinking skills, effectively analyzing data, evaluating different perspectives and solutions, and reflecting on their own learning and performance.	The student demonstrates good critical thinking skills, effectively analyzing data, evaluating different perspectives and solutions, and reflecting on their own learning and performance in most cases.	The student demonstrates basic critical thinking skills, but may struggle to effectively analyze data, evaluate different perspectives and solutions, or reflect on their own learning and performance.	The student demonstrates poor critical thinking skills, and does not effectively analyze data, evaluate different perspectives and solutions, or reflect on their own learning and performance.	The student does not demonstrate critical thinking skills and is unable to analyze data, evaluate different perspectives and solutions, or reflect on their own learning and performance.
Collaboration	The student demonstrates exceptional collaboration skills, effectively communicating with their peers, working collaboratively on group projects, and providing constructive feedback and	The student demonstrates good collaboration skills, effectively communicating with their peers, working collaboratively on group projects, and providing constructive feedback and	The student demonstrates basic collaboration skills, but may struggle to effectively communicate with their peers, work collaboratively on group projects, or provide constructive	The student demonstrates poor collaboration skills, and does not effectively communicate with their peers, work collaboratively on group projects, or provide constructive feedback and	The student does not demonstrate collaboration skills and is unable to effectively communicate with their peers, work collaboratively on group projects, or provide constructive

	support. They demonstrate effective leadership skills when necessary.	support in most cases. They demonstrate good leadership skills when necessary.	feedback and support. They may struggle to demonstrate effective leadership skills when necessary.	support. They do not demonstrate effective leadership skills when necessary.	feedback and support.

Course Content and CILOs Mapping:

Content		**CILO No.**
I	Introduction to web development for data storytelling	1
II	Data sourcing and cleaning	2
III	Design principles for data storytelling	3
IV	Interactive data visualizations	4
V	Dynamic data-driven web development	5
VI	Advanced data storytelling techniques and best practices	6

References:

1. Daniel Bugl, “Modern Full-Stack React Projects: Build, maintain, and deploy modern web apps using MongoDB, Express, React, and Node.js”, Packt Publishing , 2024
2. E. Meeks, Anne-Marie Dufour, "D3.js in Action," 3rd edition, Manning Publications, 2024.
3. Cuantum Technologies, “Fundamentals of Web Animation with GSAP: The Principles for Building Interactive and Stunning Websites: Explore the GreenSock animation platform to program engaging web experiences”, Staten House, 2024.
4. W. McKinney, "Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter," 3rd ed. Sebastopol, CA: O'Reilly Media, 2022.
5. N. Yau, "Visualize This: The FlowingData Guide to Design, Visualization, and Statistics," 2nd ed. Hoboken, NJ: John Wiley & Sons, 2024.

Course Content:

Topic

I. Introduction to web development for data storytelling
   A. Overview of the course objectives and deliverables
   B. Introduction to HTML, CSS, and JavaScript
   C. Overview of popular libraries and frameworks for data visualization

II. Data sourcing and cleaning
   A. Techniques for sourcing, cleaning, and transforming data
   B. Overview of data formats, including JSON and CSV
   C. Tools for data cleaning and transformation, such as OpenRefine and Python

III. Design principles for data storytelling
   A. Principles of data visualization,information design and artistic expression
   B. Typography,color theory and animation aesthetics for data visualization
   C. Best practices for creating effective data visualizations

IV. Interactive data visualizations
   A. Overview of interactive and animated data visualization tools, such as D3.js, Chart.js and GSAP (GreenSock Animation Platform)
   B. Techniques for creating animated, interactive data visualizations with JavaScript

C. Best practices for designing user-friendly, art-infused interactive visualizations

V. Dynamic data-driven web development
A. Introduction to server-side scripting languages
B. Techniques for building dynamic web pages that respond to user input
C. Overview of web frameworks for dynamic web development

VI. Advanced data storytelling techniques and best practices
A. Geospatial data visualization and mapping
B. Using data storytelling to drive social change
C. Best practices for data visualization and data storytelling