

**COURSE OUTLINES: BC3407 Programming for Business Transformation**

<b>Academic Year</b>	2022-2023	<b>Semester</b>	2		
<b>Course Coordinator</b>	Nguwi Yok Yen				
<b>Course Code</b>	BC3407				
<b>Course Title</b>	Programming for Business Transformation				
<b>Pre-requisites</b>	AB0403				
<b>No of AUs</b>	4				
<b>Contact Hours</b>	3hr x 13 weeks = 39				
<b>A) Course Aims</b>					
<p>This is an intermediate programming course designed for a business analytics student who has introductory programming background and is interested to learn how develop solutions for business. It is oriented to enhance your technical skillset. The aim of this course is to provide a broad understanding on how to develop programming codes to acquire, process and handle business related data. This course will equip you with the ability to write customized solutions to inform business decision, integrate Applications Programming Interface (API) for data understanding, data transformation, presenting processed information with Graphical User Interface. This module will provide you with individual hands-on practices to hone your coding skillset and opportunity to develop coding solution in a team. We utilize Python language as the medium of learning because it is the most in-demand coding language and its user-friendly syntaxes suitable in enhancing programming skills. You will utilize modern development tools to turn information into solutions.</p>					
<b>B) Intended Learning Outcomes (ILO)/Objectives</b>					
By the end of this course, you should be able to:					
<ol style="list-style-type: none"> <li>1. Interpret different elements of functions and its usage.</li> <li>2. Write codes that allow you to solve simple business problem programmatically.</li> <li>3. Design suitable interface to display business information.</li> <li>4. Apply techniques to integrate APIs, user interface for finished solutions.</li> </ol>					
See <a href="#">Annex F</a> for learning objective taxonomy.					
<b>C) Course Content</b>					
<ol style="list-style-type: none"> <li>1. Programming Introduction</li> <li>2. Connect Codes to Data Source with JSON + API</li> <li>3. Web Scraping with Beautiful Soup</li> <li>4. Object Oriented Programming</li> <li>5. Operating System Programming and Database Programming</li> <li>6. DataFrame Processing</li> <li>7. Numerical Processing</li> <li>8. Web Programming I</li> <li>9. Web Programming II</li> <li>10. Mapping Python &amp; R:</li> </ol>					
<b>D) Assessment (includes both continuous and summative assessment)</b>					
<b>Component</b>	<b>ILO Tested</b>	<b>NBS Learning</b>	<b>Weighting</b>	<b>Team/Individual</b>	<b>Assessment Rubrics</b>

		Goal (Refer to Annex E for list)			(Please insert rubrics as Appendix)
1. Class Participation	1, 2, 3, 4	Oral Comm, Critical Thinking	10	Individual	See Rubric 1
2. LAMS Attempts (Online MCQ & Short Answers)	1, 2, 3, 4	AK <sup>1</sup> , PSDM <sup>2</sup>	10	Individual	LAMS Attempts
3. Practical Assessment	1, 2, 3,4	AK <sup>1</sup> , PSDM <sup>2</sup>	40	Individual	See Rubric 2
4. Group Project (Slides & Oral Presentation)	3, 4	Oral Comm, PSDM <sup>2</sup>	40 (Project work 30% Presentation 10%)	Team <sup>3</sup>	See Rubric 3, 4
Total			100%		

<sup>1</sup>AK = Acquisition of Knowledge

<sup>2</sup>PSDM = Problem-solving & decision-making

<sup>3</sup>Group project: Students are to work in groups, and the leader of each group is responsible to submit group project works and the related submission. All team members must present. Peer evaluation will be incorporated. Peer evaluation will adopt the use of Rubrics 4 to assess individual team member's contribution to be submitted through Eureka platform. It will be a mandatory submission for all students. Each student is required to fill in the contribution of all team members in the same group (including himself/herself). Do note that a poor peer evaluation will result in a reduction in the project grading of individual student.

#### E) Formative feedback

Feedback will be provided during the class discussions. For practical assessment, the instructor will grade the submissions, discuss common mistakes and weaknesses. For the group project, graders will provide qualitative feedback for individual groups to point out what have been done right and what could have been done better.

#### F) Learning and Teaching approach

Approach	How does this approach support you in achieving the learning outcomes?
LAMS & Seminar Discussion	Students are expected to complete the pre-lessons content (LAMS) before each seminar. Seminar discussions allow opportunities to clarify content, concepts and demonstrate the analytical tools to the students as well as to hear about their intuition, experience and difficulties pertaining to the content. It also offers the opportunity to assess their ability to think critically and articulate clearly.
Coding Demonstration	This allows instructor to demonstrate programming codes and guide students through the steps of solving business analytics problem.
In-class Activities and Exercises	This would allow the students to get their hands dirty and solve simple to challenging problems and apply the programming and data modelling knowledge covered in the course.

**G) Reading and References**

Recommended Online Reference:

1. (PT) Python 3 Tutorial: <https://docs.python.org/3/tutorial/>
2. (BS) Beautiful Soup API: <https://pypi.org/project/beautifulsoup4/>
3. (SQ) SQLite API: <https://www.sqlite.org/index.html>
4. (PA) Pandas API: <https://pandas.pydata.org/>
5. (NP) Numpy API: <https://numpy.org/>
6. (FL) Flask API: <https://flask.palletsprojects.com/en/2.0.x/api/>

**H) Course Policies and Student Responsibilities****(1) General**

You are expected to complete all assigned pre-class readings and activities, attend all seminar classes punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for seminar sessions they have missed. You are expected to participate in all seminar discussions and activities. You are to attend lesson punctually

**(2) Absenteeism**

Absence from class without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate. If you miss a seminar, you must inform the course instructor via email prior to the start of the class.

Similarly for absence from assessment. Absence from assessment must be supported by valid approved reason. Valid approved reasons include unwell for the test or obtained approved Leave of Absence from school prior to the test. For the case of unwell for the test, only Singapore's issued medical certificate can be accepted. Make up test will be arranged for valid approved reason. Absence from make-up test will receive zero mark.

**I) Academic Integrity**

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the [academic integrity website](#) for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

**J) Course Instructors**

Instructor	Office Location	Phone	Email	Consultation Hours
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Nguwi Yok Yen	S3-B2A-26	6790 6129	yokyen@ntu.edu.sg	By prior appointment via email
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**K) Planned Weekly Schedule**

Week	Topic	ILO	Readings/ Activities
1	Programming Introduction	1	Installation guide; PT Documentation
2	Connect Codes to Data Source with JSON + API	1	PT Documentation
3	Web Scraping with BeautifulSoup	1, 2	BS Documentation
4	Object Oriented Programming	1, 2	PT Documentation
5	Operating System Programming and Database Programming	1, 2	PT Documentation SQ Documentation
6	DataFrame Processing	1, 2	PA Documentation
7	Numerical Processing	1, 2	NP Documentation
8	Revision and Practical Assessment	3, 4	-
9	Web Programming I	3, 4	FL Documentation
10	Web Programming II	3, 4	FL Documentation
11	Project Consultation	3, 4	-
12	Mapping Python & R:	1, 2, 3, 4	eLearning
13	Project Presentation	1,2, 3, 4	Project Part 2 Submission Due

**ANNEX B: ASSESSMENT CRITERIA****Rubric 1 (Participation)**

Traits	Performance		
	Lacking (0-3)	Good (4-7)	Excellent (8-10)
<b>Participation frequency</b>	Does not contribute in lesson	Occasionally contributes in lesson	Contributes in all lessons
<b>Participation quality</b>	No contributions/Contributions lack substance	Contributions demonstrate knowledge of subject matter	Contributions demonstrate understanding and insightful

**Rubric 2 (Practical Assessment)**

Traits	Performance	
<b>Demonstrates understanding in data types</b>	<b>Not Yet</b> Does not demonstrate understanding of programming. Confuse about the usage of data types.	<b>Substantially Developed</b> Able to differentiate and use suitable data types in programming. Make good judgement base on the given problem. Good naming convention and coding practice.
	Evaluation: Not Yet <u>1 2 3 4 5 6 7 8 9 10</u> Substantially Developed	
<b>Demonstrates ability of using appropriate coding elements.</b>	<b>Not Yet</b> Does not demonstrate ability to use coding element.	<b>Substantially Developed</b> Excellent use of good coding practice, effective application of coding elements and algorithm. Good use of control structures, iteration and function design.
	Evaluation: Not Yet <u>1 2 3 4 5 6 7 8 9 10</u> Substantially Developed	
<b>Devise strategies to construct proper model or code for analysis</b>	<b>Not Yet</b> No data model or code was developed to suitably aid the analysis.	<b>Substantially Developed</b> Well-constructed solution and code and form comprehensive analysis which examine the data from different perspectives.
	Evaluation: Not Yet <u>1 2 3 4 5 6 7 8 9 10</u> Substantially Developed	

**Rubric 3 (Group Project)**

Traits	Performance	
<b>Demonstrates understanding in functions and other code elements.</b>	<b>Not Yet</b> Does not demonstrate understanding of functions. Confuse about the usage of functions.	<b>Substantially Developed</b> Able to differentiate and use suitable functions in programming. Make good use of functions base on the given problem.
	Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> Substantially Developed	
<b>Demonstrates ability of using appropriate user interface elements.</b>	<b>Not Yet</b> Does not demonstrate ability to construct user interface element.	<b>Substantially Developed</b> Excellent use of good coding practice, effective application of user interface elements and algorithm. Good use of components.
	Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> Substantially Developed	
<b>Devise strategies to construct proper solutions</b>	<b>Not Yet</b> No suitable solution was developed to suitably address the requirements.	<b>Substantially Developed</b> Well-constructed solution and code and form comprehensive analysis which examine the requirements from different perspectives.
	Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> <u>6</u> <u>7</u> <u>8</u> <u>9</u> <u>10</u> Substantially Developed	
<b>Communication Outcome</b>	<b>Not Yet</b> Central message is not explicitly stated in the presentation. Main points are not clearly identified, audience unsure of the direction of the message.	<b>Substantially Developed</b> Central message is precisely stated; main points are clearly identified. Effectively communicate the ideas.
	Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> Substantially Developed	
<b>Communication Structure</b>	<b>Not Yet</b> No clear structure, no explanation for solution. Organizational pattern (specific introduction and conclusion, sequenced materials within the body, and transitions) is not observable.	<b>Substantially Developed</b> Organizational pattern is clearly and consistently observable and makes the content of the presentation cohesive.
	Evaluation: Not Yet <u>1</u> <u>2</u> <u>3</u> <u>4</u> <u>5</u> Substantially Developed	

**Rubric 4 (Peer Evaluation)****Teamwork & Interpersonal Skills (Peer Evaluation) Rubric**

Learning Objective: The ability to work effectively with others in a group setting.

Traits	Performance	
<b>1. Roles and Responsibility (RR)</b> Behaves professionally by upholding responsibility and assuming accountability for self and others in progressing towards the team's goal.	<b>Scant</b> Unclear about his/her own role; refuses to take a role in the group; insists to work individually and has limited coordination or communication with others.	<b>Substantially Developed</b> Always fulfills responsibilities; performs his/her role within the group with enthusiasm and demonstrates willingness to work collaboratively.
<b>Evaluation: Scant <u>1 2 3 4 5 6 7</u> Substantially Developed</b>		
<b>2. Communication (CM)</b> Identifies appropriate mechanisms to coordinate and correspond with team members.	<b>Scant</b> Modes of communication are not appropriate, causing confusion and miscommunication among team members.	<b>Substantially Developed</b> Modes of communication are appropriate, and maintaining timely communication and correspondence with team members.
<b>Evaluation: Scant <u>1 2 3 4 5 6 7</u> Substantially Developed</b>		
<b>3. Conflict Resolution (CR)</b> Resolves conflicts using a variety of approaches.	<b>Scant</b> Does not recognize conflicts or is unwilling to resolve conflicts.	<b>Substantially Developed</b> Consistently resolves conflicts through facilitating open discussion and compromise.
<b>Evaluation: Scant <u>1 2 3 4 5 6 7</u> Substantially Developed</b>		
<b>4. Contributions (CT)</b> Contributes positive input for the team; effectively utilizes one's knowledge and expertise.	<b>Scant</b> Largely disinterested in working in a group and refuses to participate; observes passively or is unwilling to share information with other team members.	<b>Substantially Developed</b> <u>Actively attends and participates in all activities and provides meaningful contribution in articulating ideas and opinions.</u>
<b>Evaluation: Scant <u>1 2 3 4 5 6 7</u> Substantially Developed</b>		
<b>5. Relationship (RS)</b> Maintains cooperative interaction with other team members regardless of individual /cultural differences and respects diverse perspectives.	<b>Scant</b> Rarely listens to others and does not acknowledge the opinions that differ from his/her own.	<b>Substantially Developed</b> Engages in respectful relationships with all other members in the team. Embraces and accepts diverse points of view without prejudice.
<b>Evaluation: Scant <u>1 2 3 4 5 6 7</u> Substantially Developed</b>		

**References:**

Teamwork Value Rubric - Association of American Colleges and Universities. Retrieved from <http://www.aacu.org/value/rubrics/pdf/teamwor>