  

**ASSESSMENT REPORT for ASSURANCE OF LEARNING**

1. **Course Information**

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| --- | --- | --- | --- | --- | --- |
| **Program** | : | MSc (FE) | | | |
| **Academic Year** | : | AY20/21 | **Mini Term** | : | 2 |
| **Course Code & Title** | : | FE8828 Programming Web Applications in Finance | | | |
| **Instructor(s)** | : | Yang Ye | | | |
| **Pre-requisites** | : |  | | | |
| **No. of AUs** | : | 1.5 AUs | | | |
| **Class Duration** | : | \_3\_ Hours x \_6\_ Sessions | | | |

1. **Course Description**

This course lays a foundation of how to process and analyze data and run statistical and financials model, which are two building blocks of a real-world program for finance analytics. It includes three main topics and one supplementary topic

1. Main topic:

a. How internet works, how to create a website with cloud computing infrastructure like Amazon Web Services.

b. To use data manipulation and data visualization to carry out exploratory data analysis and reproducible research.

c. To build finance application with data analysis and modeling (analytical and predictive)

2. Supplementary topic:

a. Cryptocurrency and payment system with blockchain

Scope

* Students can pick up new programming languages quickly, new programming paradigm (reactive, object-oriented) quickly, new functional libraries quickly.
* Students can use the tool to implement models for finance and data science, it makes them to apply what they learn.
* Students can tackle problem solving in large and small scales, i.e. from building a derivative valuation model to strategy design.
* Student can plan to build application with different input and output to satisfy needs of analytics.

1. **Learning Goal / Objective**

(Besides Acquisition of Knowledge, please check at least one learning goal you will assess and measure)

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| --- | --- | --- |
| **LEARNING GOAL** | **LEARNING OBJECTIVE** | **CHECK** |
| **TASK SKILLS** | | |
| **Acquisition of Knowledge (AK)** | *Please note that Acquisition of Knowledge applies to all courses and therefore overall scores would be taken as the measurement of students’ performance of the learning goal.* |  |
| **Ethical Reasoning (ER)** | The ability to recognize and understand ethical issues, and apply sound ethical reasoning. |  |
| **Quantitative Literacy Skills (QLS)** | The ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate). |  |
| **PEOPLE SKILLS** | | |
| **Oral Communication**  **&**  **Written Communication (C)** | The ability to communicate well with others verbally so that it clearly expresses the intended message and is understandable and useful to the receiving party. |  |
| The ability to communicate well with others in writing so that it clearly expresses the intended message and is understandable and useful to the receiving party. |  |
| **Teamwork & Interpersonal Skills**  **(TIS)** | The ability to work effectively with others in a group setting. |  |
| **Motivation & Development of Self & Others**  **(MDSO)** | The ability to develop a better understanding of one’s strengths and weaknesses, and learn to view others and mistakes positively as sources of personal and professional development. |  |

1. **Assessment Tool** 
   1. **Assessment Guide / Instructions**

*(Indicate mark allocation, if applicable)*

|  |  |
| --- | --- |
| **Assessment Component** | **%** |
| Assignments | 50 |
| Class Participation | 10 |
| Final Project | 40 |
| **Total** | **100** |

* 1. **Assessment Measure (Rubric)**

**Quantitative Literacy Skills Rubric**

**Learning Objective:** Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate).

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| --- | --- | --- | --- |
| **Traits** | | **Performance**  Evaluation: Not Yet 1 2 3 4 5 6 7 8 9 10 Substantially Developed | |
|  |  | **Not Yet** | **Substantially Developed** |
| **Interpretation** | Ability to explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words). | Attempts to explain information presented in mathematical forms, but draws incorrect conclusions about what the information means. | Provides accurate explanations of information presented in mathematical forms. Makes appropriate inferences based on that information. |
| **Representation** | Ability to convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words). | Completes conversion of information but resulting mathematical portrayal is inappropriate or inaccurate. | Skillfully converts relevant information into an insightful mathematical portrayal in a way that contributes to a further or deeper understanding. |
| **Calculation** | Ability to perform calculations. | Calculations are attempted but are both unsuccessful and are not comprehensive. | Calculations attempted are essentially all successful and sufficiently comprehensive to solve the problem. Calculations are also presented elegantly (clearly, concisely, etc.). |
| **Application/ Analysis** | Ability to make judgments and draw appropriate conclusions based on the quantitative analysis of data, while recognizing the limits of this analysis. | Uses the quantitative analysis of data as the basis for tentative, basic judgments, although is uncertain about drawing conclusions from this work. | Uses the quantitative analysis of data as the basis for deep and thoughtful judgments, drawing insightful, carefully qualified conclusions from this work. |
| **Presentation** | Expressing quantitative evidence in support of the argument or purpose of the work (in terms of what evidence is used and how it is formatted, presented, and contextualized). | Presents an argument for which quantitative evidence is pertinent, but does not provide adequate explicit numerical support. | Uses quantitative information in connection with the argument or purpose of the work, presents it in an effective format, and explicates it with consistently high quality. |

**Ethical Reasoning Rubric**

**Learning Objective:** The ability to recognize and understand ethical issues, and apply sound ethical reasoning.

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| --- | --- | --- |
| **Traits** | **Performance**  Evaluation: Not Yet 1 2 3 4 5 6 7 8 9 10 Substantially Developed | |
|  | **Not Yet** | **Substantially Developed** |
| **Ethical Sensitivity or Awareness**  Ability to sieve out, recognize and identify ethical issues and risks in the case scenario. | Unable to identify ethical elements in the case scenario. | Able to identify ethical elements in the case scenario. |
| **Ethical Knowledge, Understanding and Judgment**  Ability to raise pertinent questions or clarify relevant information to obtain a clearer understanding and/or form an appropriate judgment of the issues involved in the case scenario. | Unable to demonstrate adequate knowledge and understanding of relevant concepts and how they work. | Able to identify some of the relevant ethical notions relevant to understanding and forming an appropriate judgment. |
| **Ethical Reasoning and Solution**  Ability to apply sound and robust ethical reasoning in developing viable solutions to resolve the problems or issues. | Unable to apply ethical reasoning to resolve the relevant problems or issues. | Able to apply ethical reasoning logically and rationally to resolve the problems or issues. |

1. **Quantitative Assessment**

*Please check where applicable*

|  |  |
| --- | --- |
| I have keyed in the scores in eUreka/NTULearn site.  I need not complete Section 5. |  |
| I am not using eUreka/NTULearn site for the rubric scores.  I will complete Section 5. |  |

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| --- | --- | --- |
| **Learning Goal**  (refer to section 3) | : | **Quantitative Literacy Skills (Individual Assignment)** |
| **Learning Objective**  (refer to section 3) | : | Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate). |
| **No. of students assessed** | : | 31 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Performance Criteria / Traits** | **Below Expectations**  *(<50%)*  *(no. of students)* | **Met Expectations**  *(>=50%, <75%)*  *(no. of students)* | **Above Expectations**  *(>=75%)*  *(no. of students)* | **Mean Score[[1]](#footnote-1)** |
| **Quantitative Literacy Skills**  **(Individual Assignment)** |  |  |  |  |
| Interpretation | 1 | 3 | 27 | 2.84 |
| Representation | 0 | 16 | 15 | 2.48 |
| Calculation | 0 | 9 | 22 | 2.71 |
| Application/ Analysis | 0 | 3 | 28 | 2.90 |
| Presentation | 0 | 6 | 25 | 2.81 |
| Average | 0.20 | 7.40 | 23.40 | 2.75 |
| Percentage | 0.65% | 23.87% | 75.48% |  |

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| **Learning Goal**  (refer to section 3) | : | **Quantitative Literacy Skills (Group Project)** |
| **Learning Objective**  (refer to section 3) | : | Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate). |
| **No. of students assessed** | : | 31 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Performance Criteria / Traits** | **Below Expectations**  *(<50%)*  *(no. of students)* | **Met Expectations**  *(>=50%, <75%)*  *(no. of students)* | **Above Expectations**  *(>=75%)*  *(no. of students)* | **Mean Score[[2]](#footnote-2)** |
| **Quantitative Literacy Skills**  **(Group Project)** |  |  |  |  |
| Interpretation | 0 | 11 | 20 | 2.65 |
| Representation | 0 | 11 | 20 | 2.65 |
| Calculation | 0 | 7 | 24 | 2.77 |
| Application/ Analysis | 0 | 0 | 31 | 3.00 |
| Presentation | 0 | 19 | 12 | 2.39 |
| Average | 0.00 | 9.60 | 21.40 | 2.69 |
| Percentage | 0.00% | 30.97% | 69.03% |  |

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| **Learning Goal**  (refer to section 3) | : | **Ethical Reasoning (Group Project)** |
| **Learning Objective**  (refer to section 3) | : | Quantitative Literacy (QL) – also known as Numeracy or Quantitative Reasoning (QR) – is a "habit of mind," competency, and comfort in working with numerical data. Individuals with strong QL skills possess the ability to reason and solve quantitative problems from a wide array of authentic contexts and everyday life situations. They understand and can create sophisticated arguments supported by quantitative evidence and they can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc., as appropriate). |
| **No. of students assessed** | : | 31 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Performance Criteria / Traits** | **Below Expectations**  *(<50%)*  *(no. of students)* | **Met Expectations**  *(>=50%, <75%)*  *(no. of students)* | **Above Expectations**  *(>=75%)*  *(no. of students)* | **Mean Score[[3]](#footnote-3)** |
| **Ethical Reasoning**  **(Group Project)** |  |  |  |  |
| Ethical Sensitivity or Awareness | 0 | 0 | 31 | 3.00 |
| Ethical Knowledge, Understanding and Judgment | 0 | 0 | 31 | 3.00 |
| Ethical Reasoning and Solution | 0 | 0 | 31 | 3.00 |
| Average | 0.00 | 0.00 | 31.00 | 3.00 |
| Percentage | 0.00% | 0.00% | 100.00% |  |

1. **Qualitative Assessment**

**Describe what worked well in the course to help students attain the learning goals and why.**

**Quantitative Literacy Skills (Individual Assignments)**

This course is a progressive introduction to a diverse set of skills for programming, data analysis in the domain of finance. Individual assignments focus on practicing the individual skills. This provides a foundation for them to have sufficient basic training to progress to later stage that they are expected to combine different skills.

**Quantitative Literacy Skills (Group Project)**

Group project has a higher bar than individual assignments. It requires applying multiple skills at the same time and to apply them in-depth. This year's questions has replacement of one question from option trading to portfolio allocation. Together with other two questions: banking simulation and dynamic hedging, these three questions are good real-world exercise that students can practice programming as well as learning finance domain knowledge.

**Ethical Reasoning**

The question present both the risk and rewards and ask student to do assessment to determine the action. This presents ethnical reasoning during a typical real-world trading and risk management activities.

**What changes would you consider to the course assessment(s) or the course itself, to achieve a more desirable level of attainment of learning goals?**

**Quantitative Literacy Skills (Individual Assignments)**

This course has been improving every year. This year is a major update to give more weights to finance domain application. Next year, I will do further tweaking to the course content towards: progressiveness, broadness and creativity.

**Quantitative Literacy Skills (Group Project)**

Further refinement towards question phrasing to be clearer.

**Ethical Reasoning**

Further refinement towards question phrasing to be clearer.

**CHECKLIST FOR ASSESSMENT REPORT**

|  |  |  |
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|  |  | **Pre-Course Preparation**  *– submit Items 1-4 to Division/Program Office at least 2 weeks before course commences* |
| ✓ |  | **Course Information** |
|  |  |  |
| ✓ |  | **Course Description** (attach Course Syllabus) |
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| ✓ |  | **Learning Goal & Objective** |
|  |  |  |
| ✓ |  | **Assessment Tool**  Assessment Guide/Instruction  Assessment Measure (Rubric) |
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|  |  | **During Course** |
| ✓ |  | **Inform Students of Learning Goal(s), Objective(s) & Scoring Rubric(s)**  (i.e. how they will be assessed) |
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| ✓ |  | **Assess Students’ Work Based on Learning Objective(s) with Detailed Criteria/Trait Scores**  Key in the results in eUreka/NTULearn site OR  Tabulate by learning goal(s) on frequency distribution table  (Band 1 = below expectations, 2=met expectations or 3=above expectations) |
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| ✓ |  | **Provide Feedback to Students (use rubric as a guide)**  via eUreka/NTULearn site  OR Return scored rubric (soft or hard copy) to students |
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| ✓ |  | **Make Copies of Students’ Assignments & corresponding Scored Rubrics**  (2 “above expectations”, 2 “met expectations” & 2 “below expectations” samples) |
|  |  |  |
|  |  | **Post-Course Report**  – submit to Division Office not later than 2 weeks after course ends |
| ✓ |  | 1. **Quantitative Assessment**   - Provide Criteria/Trait Scores from Assessment of Learning Objective(s)  - Excel Worksheet to tally scores on Quantitative Assessment |
|  |  |  |
| ✓ |  | 1. **Qualitative Assessment**   - Reflect and Propose Changes |
|  |  |  |
| ✓ |  | **Submission to NBS Accreditation Office**  Completed all sections of AOL report  Rubric/Trait Scores in Excel (with the exception of those who conducted assessment via eUreka)  Assignment/Assessment Samples + corresponding Scored Rubric |
|  |  |  |
| For enquiries, email NBS Accreditation Office: nbsaccro@ntu.edu.sg  Thank you for your Assurance of Learning. | | |

1. Based on scoring key: 1=below expectations; 2=met expectations; and 3=exceeded expectations. [↑](#footnote-ref-1)
2. Based on scoring key: 1=below expectations; 2=met expectations; and 3=exceeded expectations. [↑](#footnote-ref-2)
3. Based on scoring key: 1=below expectations; 2=met expectations; and 3=exceeded expectations. [↑](#footnote-ref-3)