6075MAA Airline Scheduling and Operations

Coursework 2		Individual CW Portfolio		Cohort SEP 22/23		
Assignment No. / Title			Hand-out date:			
CW02 Arrival Simulation					2 nd May 2023	
Lecturer & Tutor Kinki Leung					Hand in date:	
					Portfolio files (Report & Program)	
					2 nd July 2023, Canvas system: 18:00	
Estimat	ted Time	Word Cou	nt Limited	% of Module	Extension & late submissions allowed:	
(hrs): 5	0 hours	to 2,500 (max)		Mark: 50%	No	
Penalti	es for Late Su	bmission:		I		
Late su	bmission is <u>no</u>	ot allowed a	nd work that	at is handed in la	te will be given a <u>zero mark</u> . If you are	
unable	to submit the	coursewor	k on time du	ue to extenuating	g circumstances, you may be eligible for	
an exte	nsion (accord	ing to your	student han	dbook). Please s	eek advice from the Module Examiner of	
your di	fficulty <u>before</u>	the submis	sion deadli	ne.		
Submiss	sion arrangem	ent online	via Canvas:	Online via Canva	IS	
File type	es: For report	MS Word o	or PDFs; For	Programs: zip al	ll programs in 1 single file	
Feedbac	ck: 3-4 weeks	after subm	ission			
Feedbad	ck method: Fe	edback via	Canvas			
Module	Learning Outc	omes Assess	ed: (Applied	MLO 2&3 only fo	r CW2)	
1.	Evaluate and	synthesize o	ontemporary	y theory and rese	arch findings to propose solutions to airline	
	operations ar	nd schedulin	g problems.			
2.	Justify recom	mendations	to improve	airline operations	s and scheduling using appropriate evidence	
	and data.					
3.	Effectively ap	oply simulati	ion and ana	lytical methods t	to model scenarios in airline operations to	
	optimize airlii	ne operation	s and suppor	t management de	ecision making.	
4.	Apply approp	oriate decisi	on making p	rocesses to resol	ve current and future challenges in airline	
	operations ar	nd scheduling	д.			
Assignm	nent Brief:					
Using the scenario and data provided for this assignment, you will need to complete all the pieces of the						
portfolio below:						
1.	1. Report (Max 2,500 ± 250)					
	a. Font ty	/pe and size:	Times New	Roman, 12 points	S	
	b. Line sp	acing: 1.5				
	c. Page m	nargins: 2.5 c	m each side			
2. Operations simulations including program file, screen re			cording on compiling your program, etc			
* Failure to follow any of the above rules may result in penalty mark or zero mark						

Arrival Simulation (Scenario)

Hong Kong International Airport (HKIA) is one of the busiest passenger airport and cargo hub in the world. The airport handled 428,870 flight movements and served 75.1 million passengers during the fiscal year ended 31 March 2019 (Normal situation).¹ Concerning the temporary closure of Terminal 2 starting in May 2020 and further arrangement for post-COVID situation, airport management is studying and reviewing performance on handling arrival flights in some areas and timeslots for facility reallocation and upgrade. Based on the information and assumptions provided, you are required to simulate the arrival process.

Table 1 listed out some information of the target flight pattern.

Flight number	Expected Arrival Time	Origin	Parking Stand
CX989	00:30	Guangzhou	N60
UO781	00:35	Singapore	S104
MM607	00:45	Osaka/Kansai	S1
UO627	00:55	Seoul/ICN	N10

Table 1: Sample Flight information on Mar 2023 https://www.hongkongairport.com/en/flights/arrivals/passenger.page

Assume the following arrival procedure performs in HKIA in this scenario²:

- 1. Immigration
 - a. Hong Kong Citizens & Residents can use Hong Kong Identity Card to pass through e-channel
 - b. Foreign Travellers need to complete arrival card and use a valid visa and passport to pass through immigration counter
- 2. Baggage Reclaim
 - a. Passengers with checked baggage need to collect their baggage at this area
 - b. Passengers without checked baggage can pass through this area
- 3. Customs & Excise
 - a. Passengers who have declared goods should use the red channel
 - b. Passengers who have nothing to declare should use green channel
- 4. Passengers proceed to Arrival Hall

Table 2 listed out the average expected number of passengers and the estimated ratio of Hong Kong Citizens & Residents and Foreign Travellers of each flight from the sample data.

Flight number	Expected number of passengers	Hong Kong Citizens & Residents	Foreign Travellers
CX989	250 - 280	80%	20%
UO781	180 - 195	90%	10%
MM607	185 - 200	85%	15%
UO627	160 - 180	75%	25%

 Table 2: Average expected number of passenger and ratio of passengers by nationality

¹ HKIA Annual report 18/19

² Arrival Procedures (<u>https://www.hongkongairport.com/en/passenger-guide/arrivals/</u>) 6075MAA CW02 Arrival Simulation

⁽https://www.hongkongairport.com/iwov-resources/file/airport-authority/publications/annual-and-interim-reports/en/18_1 9/AR1819_Eng_Full-Report.pdf)

Table 3 listed out the estimated probability of passengers with checked baggage after passing through different immigration channel.

Probability of passengers	with checked baggage	without checked baggage
E-Channel	70%	30%
Immigration Desks	60%	40%

Table 3: Estimated probability of passengers with checked baggage after passing through the immigration

Table 4 listed out the estimated probability of passengers who have declared goods after passing through the baggage reclaim area.

Probability of passengers	with declared goods	without declared goods
With checked baggage reclaim	20%	80%
Without checked baggage reclaim	10%	90%

Table 4: Estimated probability of passengers with declared goods after passing through the baggage reclaim area

Suppose five <u>parallel</u> e-channel named <u>E1, E2, E3, E4, and E5</u> respectively would be operated in this designated area and the average processing time estimated from previous data was in triangular distribution with <u>(1, 2, 3) minutes</u>. Next to the e-channel, another five <u>parallel</u> immigration desks which would be processed by four immigration officers named <u>D1, D2, D3, D4 and D5</u> respectively. Passengers pass through these immigration desks need to undergo documentation checks and finger-print procedures. The average processing time estimated from previous data is in triangular distribution with <u>(3, 5, 8) minutes</u>.

Assume that passengers with checked baggage would spend an average of <u>20 minutes</u> to claim their baggage (assume only one conveyor belt) and those without would directly go to the Custom & Excise. 2 green channels with 2 Custom officers are stayed in this designated area and the <u>average processing</u> <u>time is 0.5 minutes</u>. Next to it is another 2 red channels with 2 Custom officers and the average processing time is in triangular distribution with <u>(3, 5, 8) minutes</u>. After that, passengers will proceed to Arrival Hall.

You are required to write a report (limited to 2,500 words) on the above study which includes:

Task 1 (16% of CW02)

An introduction to the simulation, which includes <u>aims & objectives</u>, <u>assumptions</u> (other than the given requirements for the modelling), <u>measurements</u> (e.g. time unit, simulation runs, KPIs concerned or any calculations for the simulation setting) and any other relevant information which is appropriate with brief descriptions.

Task 2 (10% of CW02)

A flowchart to model the simulation with **proper labels** and **notation specification**.

Task 3 (24% of CW02)

A SIMUL8 model for the above system ("As-Is" situation). <u>Five simulation runs</u> are required. <u>An appraisal</u> for the <u>simulation results</u>. (e.g. describe the results with KPIs) An **animation** in the "As-Is" model you developed in Task4 for any one run.

Task 5 (20% of CW02)

A comparison by the use of table and diagrams of the "As-Is" scenario with at most three significant

"What-If" improvement scenarios to, but not limited to:

- Reduce queue time in each activity
- Reduce processing time in each activity
- Maximize resource utilizations

Task 6 (10% of CW02)

Recommendations for further improvement (bullet points); each significant improvement will be counted up to 2% with interpretations.

Report Writing Format (10%)

You will need to adopt the report structure provided below:

- Title page (To include report title)
- Table of contents
- List of Abbreviations/Glossary
- Introduction
- The main body of the Report
- Conclusion
- References
- Appendices

Use examples and cases from text books, journals, papers and reports to support your arguments and reference properly, using CU Harvard Reference Style.

<u>*Remarks: Remember to zip and submit all the respective files to Canvas</u> <u>Refer to CWSubmission Guide, Canvas other files submission</u>

6075MAA Airline Scheduling and Operations CW2 Assessment Form - To be completed by the Assessor

Intended Learning Outcomes assessed by this coursework: 2&3 (CW02 Arrival Simulation):

- 1. Evaluate and synthesize contemporary theory and research findings to propose solutions to airline operations and scheduling problems.
- 2. Justify recommendations to improve airline operations and scheduling using appropriate evidence and data.
- 3. Effectively apply simulation and analytical methods to model scenarios in airline operations to optimize airline operations and support management decision making.
- 4. Apply appropriate decision making processes to resolve current and future challenges in airline operations and scheduling.

Table 1: Assessment Category

(General Grading Scale >70: First, 60-69: 2:1, 50-59: 2:2, 40-59: Third; <40: Fail)

	Category	Marks((100%)	Weight
Arriva	l Simulation	/100	100% of CW02
T1	Introduction	/16	16% of CW02
<u>T1 Co</u>	nments & Feedback		
Т2	Flowchart	/10	10% of CW02
<u>T2 Co</u> i	nments & Feedback		
Т3	"As-is" Scenario	/24	24% of CW02
<u>T3 Co</u>	nments & Feedback		
Т4	Animation of "As-is"	/10	10% of CW02
<u>T4 Co</u>	nments & Feedback		
Т5	"What-if" Scenario	/20	20% of CW02
<u>T5 Co</u> i	<u>mments & Feedback</u>		
Т6	Recommendations	/10	10% of CW02
<u>T6 Co</u> i	nments & Feedback		
	Report writing Format, structure, Harvard style	/10	10% of CW02
<u>Repor</u>	t writing - Comments & Feedback		
	Total Marks	/100	100% of CW02
Stude	nt ID:		
Similarity index reported by TurnItIn: Word Count:			
Name	/Signature of Assessor:	Date	
ivame	Signature of Assessor.	Date.	

Marking Rubrics (CW2)

 First >70%
 2:1 60-69%
 2:2 50-59%
 Third 40-49%
 Fail < 40%</th>

ILOs/	MILO1 & MILO2	MILO3	Visual Animation	Report writing: Referencing Presentation and Use of
Grading	Т1, Т2, Т3	Т5, Тб	showing analytical	English in the report
Criteria			applications T4	
(% Range)				
Outstanding > 70% (Distinction)	Illustrate good and systematic understanding of the scenarios in airline operations. All related methods and models applied correctly, and detailed processes and correct results presented clearly and logically. Almost of the results are correct.	Identify and critically discuss the key issues of potential operational problems and irregularities. Provide in-depth analysis about various factors, relevant examples, cases and information organized in a structured manner and analyzed with respect to the issues.	20-40s Animation shows all the analytic steps and clearly display the final answers	Excellent referencing, consistent and in accordance with CU Harvard. Good and appropriate sources used evidence of research appropriate to the task. The report is structured and presented to a first class standard. There is logic in assembly and composition, with a natural flow of works.
Excellent 60-69% (Merit)	Illustrate moderate understanding of the scenarios in airline operations. All related methods and models applied correctly with clear processes. Correct results with brief explanations.	Clearly identify and discuss the key issues of potential operational problems and irregularities. Analysis with relevant descriptions and evidences on various factors	Animation shows most of the analytic steps with final answer display	 High standard of referencing. Few minor errors or inconsistencies More sources could be used or identified to enhance the work. Overall report writing is good and smooth. Few or minor errors in grammar, flow of work or structure.
Good Quality 50-59% (Merit)	Illustrate some understanding of the scenarios in airline operations. Most of the related methods and models are applied properly, the processes might have some limitations but completed, and the results might have few errors.	Identify and discuss the issues of potential operational problems and irregularities with some evidences. Analysis with some clear descriptions on various factors	Animation shows some of the analytic steps or final answer display not clearly	Few noticeable inconsistencies and/or errors and lacking further appropriate sources for the task. There were few noticeable grammatical and spelling errors and the report lacked a degree of flow/ structure.

ILOs/	MILO1 & MILO2	MILO3	Visual Animation showing	Report writing: Referencing Presentation and Use of
Grading	Т1, Т2, Т3	T5 , T6	analytical applications	English in the report
Criteria			Т4	
(% Range)				
Acceptable	Illustrate the basic understanding of the	Identify and discuss the issues of potential	Animation display not clearly on	Some noticeable inconsistencies and errors. Lacked the
40-49%	scenarios in airline operations. Most of	operational problems and irregularities with	showing the steps and answers	depth of sources needed for this task.
(Pass)	the related methods and models are	few evidences. superficial analysis conducted		There were significant grammatical and spelling errors
	applied properly, the processes might be	about various factors		and the report lacked structure and flow.
	uncompleted, and the results might have			
	some errors.			
Fail	No or not practical simulations and not	Incomplete or no discussion of potential	Animation shows some, but missing	Inadequate or largely inaccurate referencing, of a poor
39.5% or less	related to the situation.	irregularities and disruption that might	analytic steps or answers	or unacceptable quality
		happen during any airline operations.		The spelling and grammar was poor. There was little (to
				no) structure and no flow.