

**MID-TERM EXAM II
TAKEHOME EXAM
INSTRUCTIONS**

1) Initial: I have adhered to the University Honor Code _____

Note: All violations of Honor Code will be reported

2) OPEN Book

3) Write and draw clearly. Provide explanations were required.

4) Turn in hard-copy (with answers).

5) Good luck and Have Fun!

TOTAL POINTS = 100

1) Air Traffic Control and Arrival/Approach Procedure Design

WARNING: DO NOT WAIT UNTIL THE LAST MINUTE TO COMPLETE THIS ASSIGNMENT. IT WILL TAKE TIME (I.E. REPETITIONS) TO DEVELOP THE COGNITIVE SKILLS REQUIRED TO COMPLETE.

Go to website <http://www.atc-sim.com>. Set-up the simulation according to the instructions below. Control traffic as described below. When you have successfully landed 10 flights, issue the “STATS” command to display your performance, and take a screenshot. Turn in the screenshot as part of the mid-term exam.

Notes:

ATC-sim is web-based. No plug-ins or additional software required.

Step 1) Configure Simulation on the Home page as follows:

- 1) Airport – Chicago O’Hare (ORD) (default)
- 2) Airline Codes – ICAO 3 digit (default)
- 3) Wind Direction – Wind will not change (default)
- 4) Realism – Arrivals Only
- 5) Map Scales and Markers – your choice
- 6) Press “Begin Simulation” Button

Step 2) Begin Simulation

- 1) Determine the wind direction and choose runways to land flights into the wind. Flights can use runways for arrival is tail-wind is less than 10 knots and cross-wind is less than 20 knots.
- 2) Determine an arrival and approach procedure to land on parallel runways. Use the waypoints and fixes as part of the approaches.
- 3) Enter commands as follows into the “ATC instruction” text field on the lower right and select the GO button (may not work when hit the ENTER key on some browsers). Make

sure browser status bar (lower right hand-side of browser) is working to check acceptance of your ATC instructions. If not working enable Java/Java Script through Options menu on browser.

- a. Each entry in the ATC instruction text field must be preceded by the flight number (i.e. FlightID). You can click on the flight strip to transfer the flight number to the textfield. If you type the flight number, be careful to type the flight number correctly
- b. After the FlightID leave a space and then type one of the following instructions:
 - i. FlightID L XXY (lands the aircraft on runway XXY (e.g. 27L, or 27R), must be within +/-60 degrees course with runway centerline, flying on a heading to intercept the runway centerline and 2000 ft or below to intercept a 3 degree glideslope to the runway)
 - ii. Flight ID C XXX (steers aircraft to course specified by 3 digits)
 - iii. FlightID C X (climbs or descends aircraft to altitude in thousands of feet specified by 1 digit)
 - iv. FlightID C ZZZ (steers aircraft direct to waypoint or fix defined by three letter identifier (e.g. BONZO))
 - v. FlightID C X EX (the suffix EX or X will expedite the descent or climb)
 - vi. Arrivals will slow down for approach automatically
 - vii. Arrivals that appear on the screen will be shown in the “flight Strip” as pale yellow boxes with Flight Number, Course, Altitude, maneuver (= level flight, up arrow climbing, down arrow descending), Type of Aircraft, and Type of procedure (e.g. arrival)
 - viii. Note: Clicking on the Flight Strip for a flight automatically puts the FlightID in the “ATC instruction” text field.
 - ix. Note: make sure the confirmation of your entry in the ATC Instruction text field is displayed in the status bar of the browser (lower left corner). If not “Enable Java Script” via Options menu.

Step 3) Record Your Performance Enter STATS in the textfield to display your scorecard and take screenshot, when you have landed 10 flights (20 points)

Step 4) Answer the following questions (Turn in this section)

1))Throughput (20 points)

- a. Note the time the first flight lands. Note the time the last flight lands (i.e. 10th flight). What was your throughput (flights/15 minutes or flights/hour)
- b. What strategies could you have used to increase your throughput. Explain
- c. What are the implications on safety and workload for your strategy described in part (b) of this question

2) Safe Separation (20 points)

- a. What is considered to be “safe separation” in this simulation
- b. What strategy of rule-of-thumb did you use to maintain safe separation. Explain what visual cues and/or heuristics you used to achieve this.
- c. How many “Violations” did you have? Explain how these occurred. Explain what you could have done to avoid these.

3) Arrival and Approach Paths (40 points)

- a. Diagram the arrival and approach procedure (i.e. path) you used for each runway.
- b. Why did you choose this procedure? Explain the reason for the distances and degrees in the turns. Explain why other designs you may have tried failed.
- c. Describe the ATC instructions that you used to command flights to the arrival and approach procedure. Explain why these instructions were used.

Hints:

- 1) Download and read Tutorial on ATC-Sim home page (button on right-hand side of menu bar)
- 2) Do not let plans collide (i.e. same altitude, same point in space at same time, or else you will need to start over)
- 3) Get ideas for arrival/approach procedure design from YouTube (e.g. http://www.youtube.com/watch?v=_IP75kng03w, <http://www.youtube.com/watch?v=IVh7LA5u-IU&feature=fvw>)