



Methodology for Departmental Zone Room Allocation in Hybrid Simulation

In the Hybrid Simulation, the Departmental Zone model replaced the Tier 1/Tier 2 model for room allocation. During the consultation and engagement phase of the Vancouver Scheduling Project, each department was asked to identify a departmental centroid, creating a unique zone for each course code. Wherever possible, sections were scheduled within a 5- or 10-minute walking distance from that centroid. During simulation, sections scheduled in Restricted Teaching Space (RTS) were not altered. Remaining sections, including those previously scheduled into General Teaching Space (GTS), were assigned rooms using the Departmental Zone room allocation model. Course sections were prioritized according to the criteria listed in the *Course Priority Groups* section below.

WALKING DISTANCE

- Walking distance was calculated by using building locations and walking paths from UBC Geodata (<https://github.com/UBCGeodata>) and a walking speed of 80m/min.
- Travel paths were calculated from the department's identified centroid building
- All rooms in a given building were assumed to be located at the geographic centre of a building and on the ground floor.
- All GTS rooms in buildings within 2.5-minute walking distance from the centroid were designated to the Primary Zone. Maximum walking time between any two buildings in the Primary Zone would be 5 minutes.
- All GTS rooms in buildings within a 5-minute walking distance from the centroid were designated to the Secondary Zone. Maximum walking time between any two buildings in the Secondary Zone would be 10 minutes.

OVERLAPPING ZONES

- Rooms may be designated to more than one Departmental Zone if Departmental Zones overlap.

EXCEPTIONS

- Some sections were not able to be scheduled in their Primary or Secondary Departmental Zones for several reasons, including room features and Planned Size.
- Due to limited rooms with capacity of 300+, these rooms were excluded from Primary and Secondary Zones and sections with Planned Sized of 300+ were scheduled manually.



Course Priority Groups

All course sections were assigned to a Course Priority Group based on accessibility requirements, Planned Size and status as Core or Elective. Pedagogical room features were assessed for each Course Priority Group.

NOTE: Core courses are indicated in the UBC Academic Calendar as those that are necessary for completion of a degree program. The Course Priority Groups are as follows:

1. Course sections with accessibility accommodations*
2. Core course sections of Planned Size 300 and above
3. Core course sections of Planned Size 250-299
4. Core course sections of Planned Size 200-249
5. Core course sections of Planned Size 150-199
6. Core course sections of Planned Size 100-149
7. Core course sections of Planned Size 70-99
8. Core course sections of Planned Size 60-69
9. Core course sections of Planned Size 50-59
10. Core course sections of Planned Size 45-49
11. Core course sections of Planned Size 40-44
12. Core course sections of Planned Size 35-39
13. Core course sections of Planned Size 30-34
14. Core course sections of Planned Size 27-29
15. Core course sections of Planned Size 25-26
16. Core course sections of Planned Size 20-24
17. Core course sections of Planned Size 10-19
18. Core course sections of Planned Size 1-9
19. Elective course sections of Planned Size 300 and above
20. Elective course sections of Planned Size 250-299
21. Elective course sections of Planned Size 200-249
22. Elective course sections of Planned Size 150-199
23. Elective course sections of Planned Size 100-149
24. Elective course sections of Planned Size 70-99
25. Elective course sections of Planned Size 50-69
26. Elective course sections of Planned Size 40-49
27. Elective course sections of Planned Size 35-39
28. Elective course sections of Planned Size 30-34
29. Elective course sections of Planned Size 25-29
30. Elective course sections of Planned Size 20-24



31. Elective course sections of Planned Size 10-19
32. Elective course sections of Planned Size 1-9

*This group will be included in the implementation guidelines based on stakeholder feedback. It was not included in the simulation as accessibility information was not collected for the simulation.

Scheduling Priority Groups and Rejects

Room block-offs for maintenance and other room special agreements that take priority over academic courses were scheduled prior to the Course Priority Groups.

Course Priority Group #1 (Course sections with accessibility accommodations) was not included in the simulation as accessibility information was not collected for the simulation.

Starting with Course Priority Group 2, Scientia attempted to bulk schedule all course sections within the group. Some sections could not be bulk scheduled (rejects). This could happen for a variety of reasons, including but not limited to:

- No room available at the section's Day and Start Time that met all the constraints of the section (zone, room features, Planned Size)
- No room in the section's departmental zone that met the room features selected (e.g. FREN sections desired Active Learning Classroom but the FREN departmental zone does not have any Active Learning Classrooms)
- No room in the section's departmental zone that was large enough (e.g. FMST had sections of Planned Size 100+ rejected because the largest room in the FMST zone has a maximum capacity of 94)
- Not enough rooms in a departmental zone to accommodate all their sections (e.g. ECON had more sections than could possibly fit in their centroid, IONA building)
- An error with the section that prevented it from scheduling

Note: In order to investigate Scientia's scheduling algorithm, the bulk scheduling process was repeated a few times to check if the same sections were always rejected. It was found that the same sections were rejected each time.

Rejects were manually adjusted and scheduled. The system attempted to schedule at each step and moved on to the next step if needed. All sections were successfully scheduled in each Course Priority Group before moving onto the next Course Priority Group. For each reject, the following steps were taken in order:



1. Reject was checked for any issues or mistakes that could be preventing it from scheduling (e.g. reject is mistakenly set to unavailable all the time);
2. Department Qualtrics Survey responses to question #1) were reviewed:
 - a. If 'Room Features' was rated a lower priority than 'Room location within/close to departmental building':
 - i. Room feature(s) were removed from the reject;
 - ii. Zone was removed from the reject;
 - iii. Planned Size of the reject was reduced (as low as to match 2019W enrolment);
 - b. If 'Room location within/close to departmental building' was rated lower priority than 'Room Features':
 - i. Zone was removed from the reject;
 - ii. Room feature(s) were removed from the reject;
 - iii. Planned Size of the reject was reduced (as low as to match 2019W enrolment);
3. If there was no Qualtrics Survey submitted by the department there was no record of a preferred priority for scheduling sections. In these cases, any of the actions below may have been taken to allow the section to be scheduled:
 - a. Zone was removed from the reject;
 - b. Room feature(s) were removed from the reject;
 - c. Planned Size of the reject was reduced to match 2019W enrolment data;
4. If the reject had different days of the week and start time from 2019W, the days of the week and start time were changed to match 2019W.

The above process was applied to all Priority Groups.

QUALITY CONTROL

Once all sections were scheduled, the timetable was manually reviewed for quality control. The process included spot-checking course sections and rooms, and making adjustments to ensure the scheduled room was a suitable fit. Examples of adjustments that were made include moving a section to a room that matched its planned size more effectively than where it had been scheduled, and moving a section based on department notes on pedagogical room criteria not captured by Scientia.