48-747 Shape Grammars

Spring Semester  6-12 units • MF 11.00-12.20 • MM 415 IW

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Course Website:
http://www.arc.cmu.edu/users/ramesh/course/48-747/
(under construction)
To introduce spatial grammars and their applications, primarily to design and composition.

Emphases on the formal and informal aspects of grammars, evolution of grammatical ideas, their relevance, application and use in the analyses of ‘styles’, synthesis of ‘form’, and incorporation of ‘function’, and not least, in teaching grammars to a computer.

*Shape grammars*, will be examined in detail.

For nearly three decades, grammars have been used extensively to understand styles of architecture, landscape design, fine art and ornament.

course objectives
Course Description

- Introductory course

- A 6 unit assignment-based course (without prerequisites)

  OR

- Extended to a full semester with a shape grammar project component (for some this may involve programming)
Fundamental notions of grammars and rewriting systems, languages of grammars
Introduction to shape grammars and their properties
Transformations of grammars
Other kinds of spatial grammars
e.g., structure, solid grammars, graph and color grammars
Application of grammars to aspects of architecture and urban design

Application of grammars to other disciplines
Weights, sorts and augmented spatial grammars
Implementing shape grammars [and other spatial grammars]
Recent trends in grammar research
Other topics suggested by students

course topics
Graduate students will be *evaluated* on the full semester course (worth min. 9 units).

Undergraduate students will be *initially evaluated* for a half-semester course (worth 6 units). Students who score at least C+ at mid-semester may proceed to the full semester course for credit.

The project and any accompanying preparatory assignments will be worth an additional 3 units.

Students may also complete the computational assignment for an additional 3 units. This assignment is required of all Computational Design students.

course credit
Grammar assignments (5 units)
In class participation (1 unit)

Project + any preparatory assignment (3 units)
Computational assignment (3 units)

First mini

Second mini

Required of all CD graduate students
Reflection of your affinity and flair for the subject matter.

A 90+  B 80+  C 70+

A (excellent) means that you have scored at least B or better in each assignment.

B (good) means that you have at least successfully completed (passed) each assignment.

C means you do not fail the course, and you either you performed uniformly badly, or failed in one of the assignments.

A tendency to mark hard assignments *leniently* and easy assignments

*grading*
Everyone to do well

Have a tendency to mark *hard assignments leniently* and *easy assignments hard*.

*Written* parts for any assignments must be *grammatical*.

*Drawn* parts for any assignment must be *neat* (if you can’t freehand neatly, use a computer drawing program).

*Programmed* parts or algorithms for any assignment must have *a clear logic*.

**expectations**
motivated by Frederick Froebel’s Kindergarten model of free play and creativity through his gifts

paradigm: child’s play
in a shape grammar one can find …

structure
order
chaos
ambiguity
emergence
meaning
prairie houses of fr

little house  robie house  march house  stiny house
go to introductory lecture
palladian grammar
malagueira
Generation of Zhāi-zing shān-zhūn
(A three-dimensional exposition)
procedural modeling in the computer graphics field
procedural modeling
structures grammar
condition(tube1, 'Tube has no geometry.').

lhs(tube1, [Tube], [Part1, Part2]):-
  schematic_tube_connections(Tube, Part1, Part2),
  in_context(Tube),
  not occurrence_has_geometry(Tube),
  occurrence_has_geometry(Part1),
  occurrence_has_geometry(Part2).

description(tube1, 'Create a tube and its fittings.').

rhs(tube1, [Tube]):-
  make_tube(Tube).

piping in the landing bay – boeing 777
queen anne houses
cross-over vehicles
Baltimore rowhouses

Fig. 9. Row of two-and-a-half-story, federal style houses, built 1815-20. 815-829 South Charles Street, Baltimore. Andrew Rohr’s row, 815-819, is on the left. John Cator’s row, 821-829, is on the right. (Photo, M. E. Hayward.)
high-rise apartments