

# Introductory PL course for non-CS major students in Ochanomizu University

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# Course Overview

Goal: each student builds her own game  
(and experience logical thinking)

- around 40 students: 10 non-science majors, 20 non-CS majors, (10 CS majors)
- no prior programming experience
- 90 minutes lecture, 15 weeks
- (20 min lecture, 25 min lab) \* 2
- Students program only in the class.
- 10 teaching assistants (crucial)

# Course Material

How to Design Worlds  
(Felleisen, Findler, Fisler, Flatt, Krishnamurthi)  
<http://world.cs.brown.edu/>

- Draft textbook available online.
- Very early and short draft, but easy to read.

Why this book:

- Fun (game programming).
- The PL barrier is the least minimum.
- Yet, enough logical thinking.
- World-passing style.

# World-Passing Style (Course Plan)

World represents the state of the game. API:

`big-bang` :: num \* num \* num \* world → true  
;; opens a window and starts a game (week 2)

`on-redraw` :: (world → scene) → true  
;; registers the drawing function (week 2)

`on-tick-event` :: (world → world) → true (week 3, 4)

`on-key-event` :: (world \* key-event → world) → true (week 5)

`on-mouse-event` :: (world \* num \* num \* mouse-ev → world) → true  
;; register the event handling functions (week 8)

`stop-when` :: (world → bool) → true (week 6)  
;; registers the game-over condition

(week 7: define-struct, w9: misc. data, w10–11: list, w12–15: lab)

# Assessment

The course goes pretty well.

Most of the students actually create interesting games.

Important:

- DrRacket environment
  - Pasting image in a program
  - stepper, beginning language
- World teach pack requires functions that are:
  - trivial (most of the time), yet
  - necessary for the game
- Many TAs

They bridge gap between students and logical thinking.

# Obstacles

No type support.

- The `world` data structure is often extended.
- Students inevitably forget to extend some of them.

Teaching recursion is hard.

- Students want to use lists.
- But `place-image` is inherently sequential.
- Teach `map` rather than recursion?
- Impossible in the beginning student language?

Error messages are in English.

# Is a world not enough?

Universe is not necessarily necessary.

- Students are already very happy.
- The logical thinking is possible with a world.
- It is difficult to introduce another concept within the current course plan.

In the past four years, only one CS-major student wanted a universe.

# Summary

DrRacket + World (Universe) teach pack is an ideal platform for non-experts programming.

- Good environment, good abstraction, many TAs

Students can concentrate on the problem domain  
(and experience logical thinking).

Possible direction:

- Teach map instead of recursion?
- Type support?
- Error messages in Japanese?