7 Maps

1. **scheme**
   MAP_UNIVERSITY_SYSTEM =
   class
   type
   Student,
   Course,
   Course_infos = Course $\overset{m}{\rightarrow}$ Student-**set**,
   University = {| (ss, cis) : Student-**set** × Course_infos • is_wf(ss, cis) |}

   value
   is_wf : Student-**set** × Course_infos → **Bool**
   is_wf(ss, cis) ≡ (∀ ss′ : Student-**set** • ss′ ∈ **rng** cis ⇒ ss′ ⊆ ss),

   students : University → Student-**set**
   students(ss, cis) ≡ ss,

   courses : University → Course-**set**
   courses(ss, cis) ≡ **dom** cis,

   stud_of : Course × University $\xrightarrow{\sim}$ Student-**set**
   stud_of(c, (ss, cis)) ≡ cis(c) **pre** c ∈ courses(ss, cis),

   attending : Student × University $\xrightarrow{\sim}$ Course-**set**
   attending(s, (ss, cis)) ≡
   { c | c : Course • c ∈ **dom** cis ∧ s ∈ cis(c) }
   pre s ∈ students(ss, cis),

   new_stud : Student × University $\xrightarrow{\sim}$ University
   new_stud(s, (ss, cis)) ≡ (ss ∪ {s}, cis) **pre** s ∉ students(ss, cis),

   drop_stud : Student × University $\xrightarrow{\sim}$ University
   drop_stud(s, (ss, cis)) ≡
   (ss \ {s}, [c ↦ cis(c) \ {s} | c : Course • c ∈ **dom** cis])
   pre s ∈ students(ss, cis),

   sizes_ok : University → **Bool**
   sizes_ok(ss, cis) ≡
   (∀ c : Course • c ∈ **dom** cis ⇒ (**card** cis(c) ≤ 100 ∧ **card** cis(c) ≥ 5))
   end