



Entity Relation Model for Academic system of IITK

Above ER Model describes the academic system of IIT Kanpur, let's discuss each of the attributes and relationships in more detail.

Entities

- **Student:** The student entity has a unique Roll Number, with other attributes being name, emailID. We can derive other things like the batch of student, year of joining from the roll number.
- **Faculty:** Faculty has a unique code (faculty ID) which acts as the primary key. Faculty entity also has office address, phone number/s etc.
- **Department:** Department entity has a unique department ID, website and the name. We can store other things like department address etc, but that won't be relevant for academic perspective.
- **Course:** This entity represents the courses available in IITK, with course ID being the primary key. Courses have a multi-valued attribute type, which represents the different categories in which this course can be taken, for eg DE, OE, HSS etc. Note that pre-requisites is also a multi-valued attribute, since there can be more than one pre-reqs.
- **Program:** This entity represents the different programs offered in a particular department. This can be BTech, MTech, PhD or minor in Algorithms etc. This entity is uniquely identified by the program ID.

Relationships

- **Faculty Advisor:** This relationship is useful for MTech/PhD students, it represents the faculty advisor for that student. Attribute thesis title is needed for research title. Note that we can also store the UGP supervisors for the UG students here.
- **Student-Department:** This relationship defines how a student is related to a particular department. It has attribute program ID to represent this relation. For example student A is doing minors in Algorithms, then he is related to CSE with program ID = program_ID(algorithms).
- **Faculty-Dept:** It represents the department which a faculty belongs to. It has an attribute PoR to represent if he is holding some position in the academic committee of department, eg Prof. Anil Seth is DUGC of CSE, so this attribute will be DUGC for him.
- **Course Undertaken:** This relationship is to define the courses a student has done in past or doing currently. It has attribute grade, which can be used in SPI/CPI calculation. Course Nature is fresh/repeat etc. Course type is used to represent how this student is doing this course, as student A might do CS315 as DE, while other might do it as an OE. Program ID is maintained to know this student is doing this course in order to complete which program. For example student A might be doing ESO207 in order to complete his BTech in CSE, while B might do ESO207 to complete a minor in algorithms. Quantity attribute is used to incorporate thesis course. For normal course this value is 1. But for MTech/PhD this can be > 1. Let's say that student A is taking 4 thesis credits, this would mean that he is taking course CS699 (or other equivalent) 4 times, for which he would get different grades. Also note that grade is a multi-valued attribute for the above reason, as an MTech might get 3 different grades in the 3 thesis credits.
- **Offering:** This relationship between course and faculty represents the offering of this course by this particular faculty. This offering has year, semester as attribute as an instructor might offer same course multiple times. This relationship also contains some other relevant information like lecture hall, tutors, TA, and course timings.
- **Dept-Course:** This relationship is necessary since a course is offered by faculty members of a particular department only. For example MTH101, would only be offered by faculty members of mathematics department only.

- **Programs offered** This relationship incorporates which all programs are offered by a particular department. For example CSE offers minors in 5-6 fields, major, BTech, Dual etc.
- **Template** Relationship between program and course is needed to store which all course one needs to complete in order to get this program's recognition. This relationship has an attribute semester, which would signify, in which semester one should do this course, for example, CSE BTechs need to do LIF101 in 2nd semester. Course type is similar to what we discussed in course entity. ie how one should take this course in order to complete the template. For eg LIF101 should be done as IC by UGs.