UNIVERSITY OF ENGINEERING & MANAGEMENT, KOLKATA

Course Name : Database Management System

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Module 2 : Cardinality Constraints

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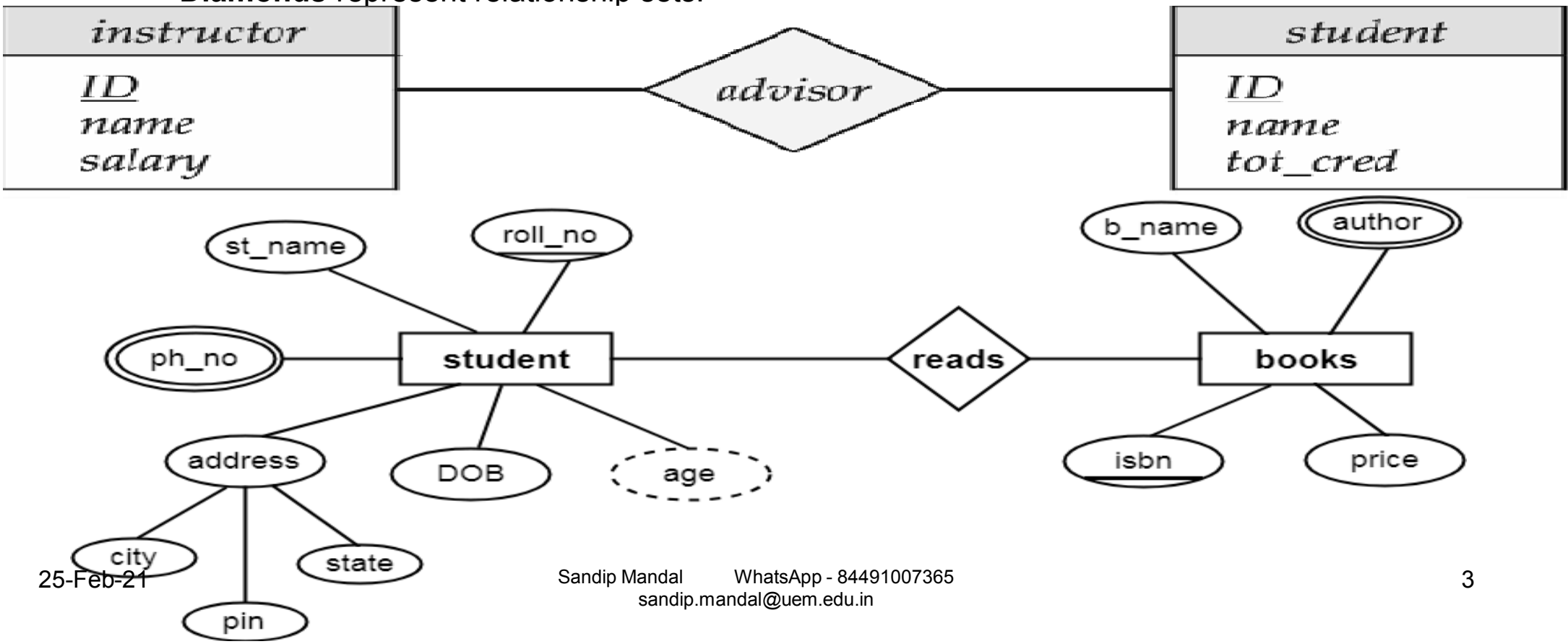
Relationship Sets

- **Diamonds** represent relationship sets.



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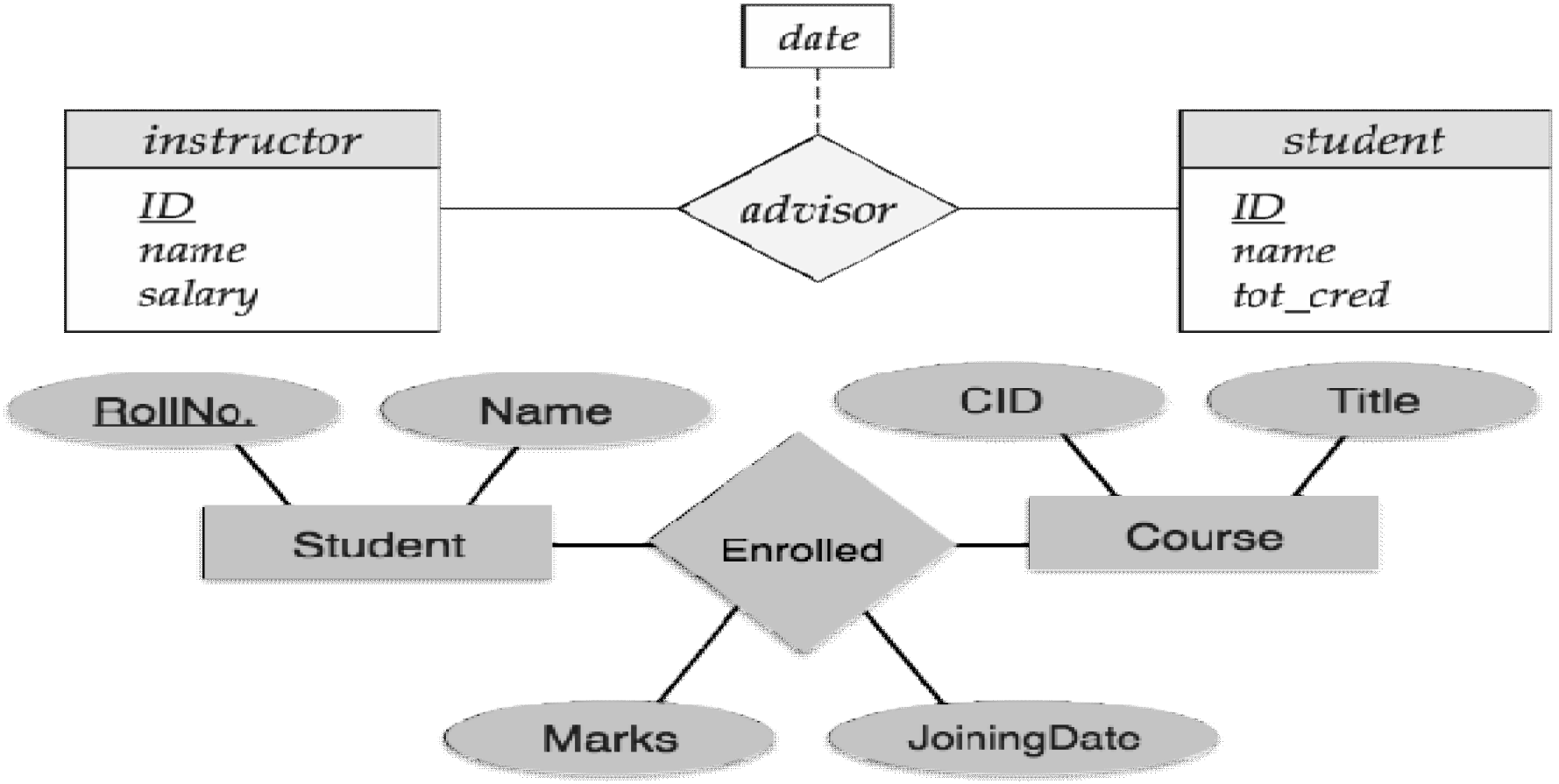
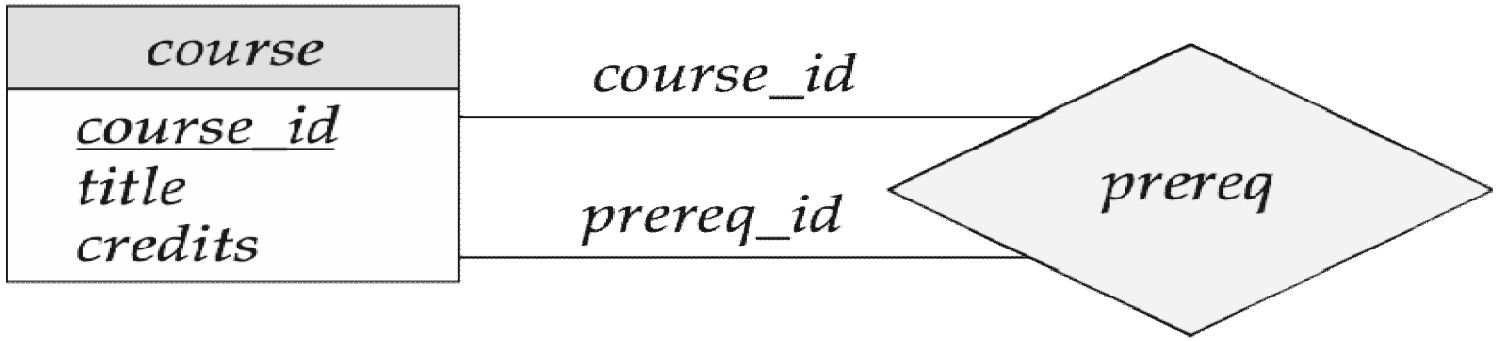
Relationship Sets with Attributes



Roles

- Entity sets of a relationship need not be distinct
  - Each occurrence of an entity set plays a “role” in the relationship
- The labels “*course_id*” and “*prereq_id*” are called **roles**.



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Cardinality Constraints

- We express cardinality constraints by drawing either a directed line **(→), signifying "one"** or **an undirected line (—), signifying "many"** between the relationship set and the entity set.

- **One-to-one** relationship between an *instructor* and a *student* :
  - A student is associated with at most one *instructor* via the relationship *advisor*
  - A *student* is associated with at most one *department* via *stud_dept*

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One-to-Many Relationship

- one-to-many relationship between an *instructor* and a *student*
  - an instructor is associated with several (including 0) students via *advisor*
  - a student is associated with at most one instructor via advisor,

Many-to-One Relationships

- In a many-to-one relationship between an *instructor* and a *student,*
  - an instructor is associated with at most one student via *advisor*,
  - and a student is associated with several (including 0) instructors via *advisor*

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Many-to-Many Relationship

- An instructor is associated with several (possibly 0) students via *advisor*
- A student is associated with several (possibly 0) instructors via *advisor*

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Total and Partial Participation

- **Total participation (indicated by double line):** every entity in the entity set participates in at least one relationship in the relationship set

participation of *student* in *advisor* relation is total

  - **every *student* must have an associated instructor**

- **Partial participation:** some entities may not participate in any relationship in the relationship set
  - Example: **participation of *instructor* in *advisor* is partial**

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Notation for Expressing More Complex Constraints

- A line may have an associated minimum and maximum cardinality, shown in the form *l..h*, where *l* is the minimum and *h* the maximum cardinality
  - A minimum value of 1 indicates total participation.
  - A maximum value of 1 indicates that the entity participates in at most one relationship
  - A maximum value of * indicates no limit.

Instructor can advise 0 or more students.

A student must have 1 advisor; cannot have multiple advisors.

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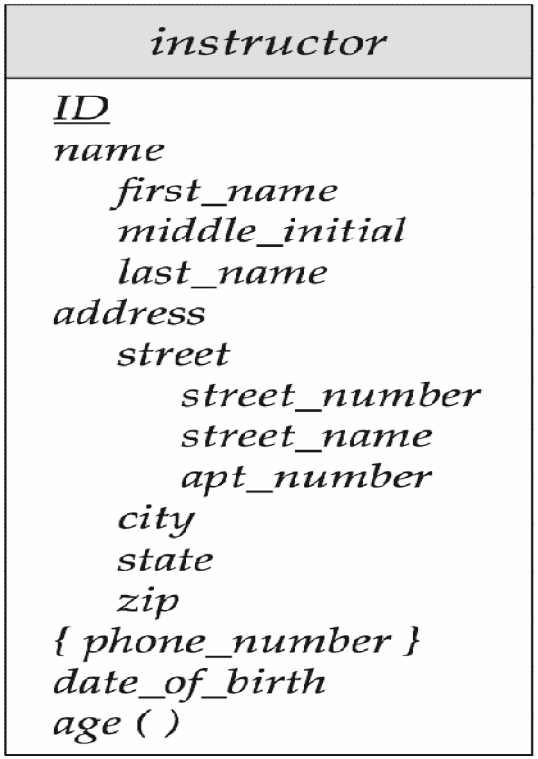
Notation to Express Entity with Complex Attributes



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Expressing Weak Entity Sets

- In E-R diagrams, a weak entity set is depicted via a double rectangle.
- We underline the discriminator of a weak entity set with a dashed line.
- The relationship set connecting the weak entity set to the identifying strong entity set is depicted by a double diamond.
- Primary key for *section* – (*course_id, sec_id, semester, year*)

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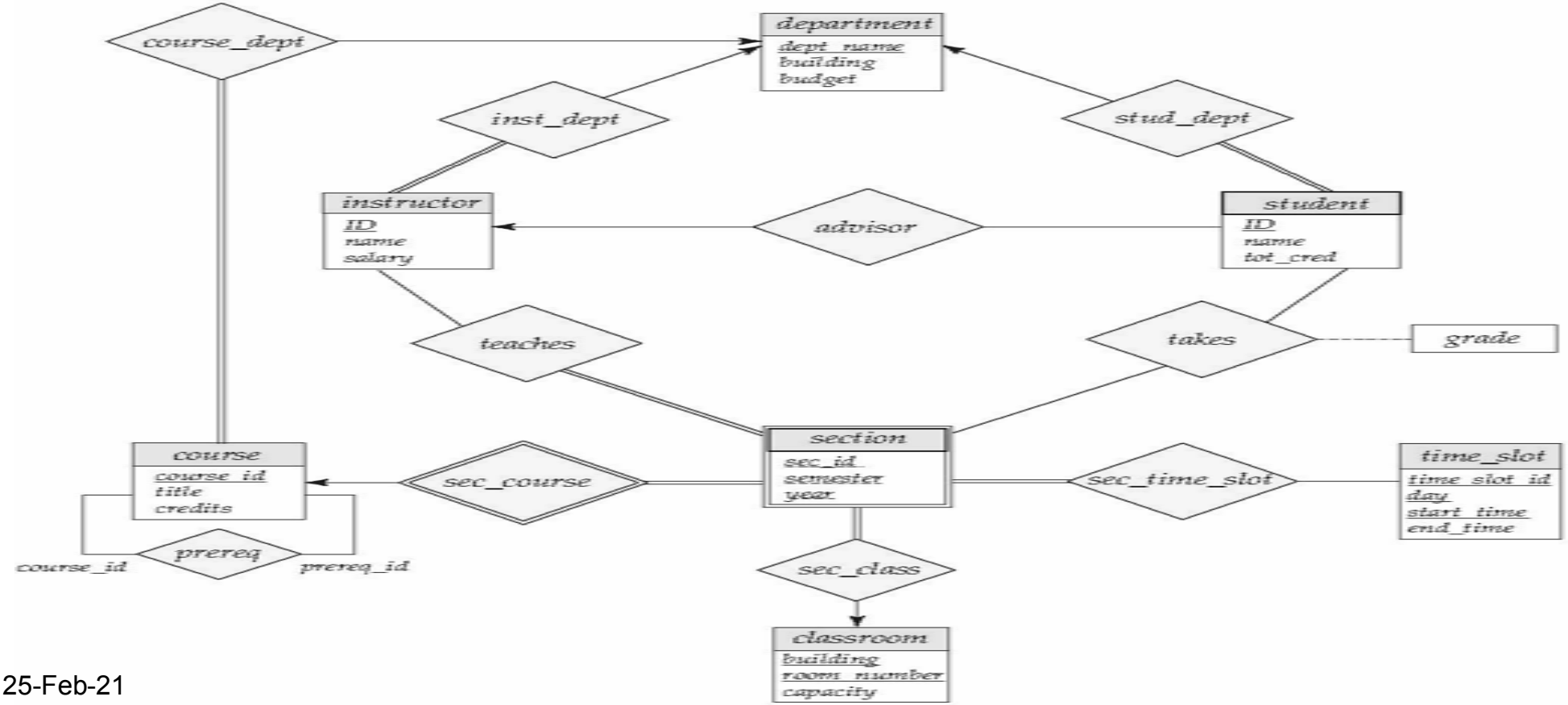
E-R Diagram for a University Enterprise



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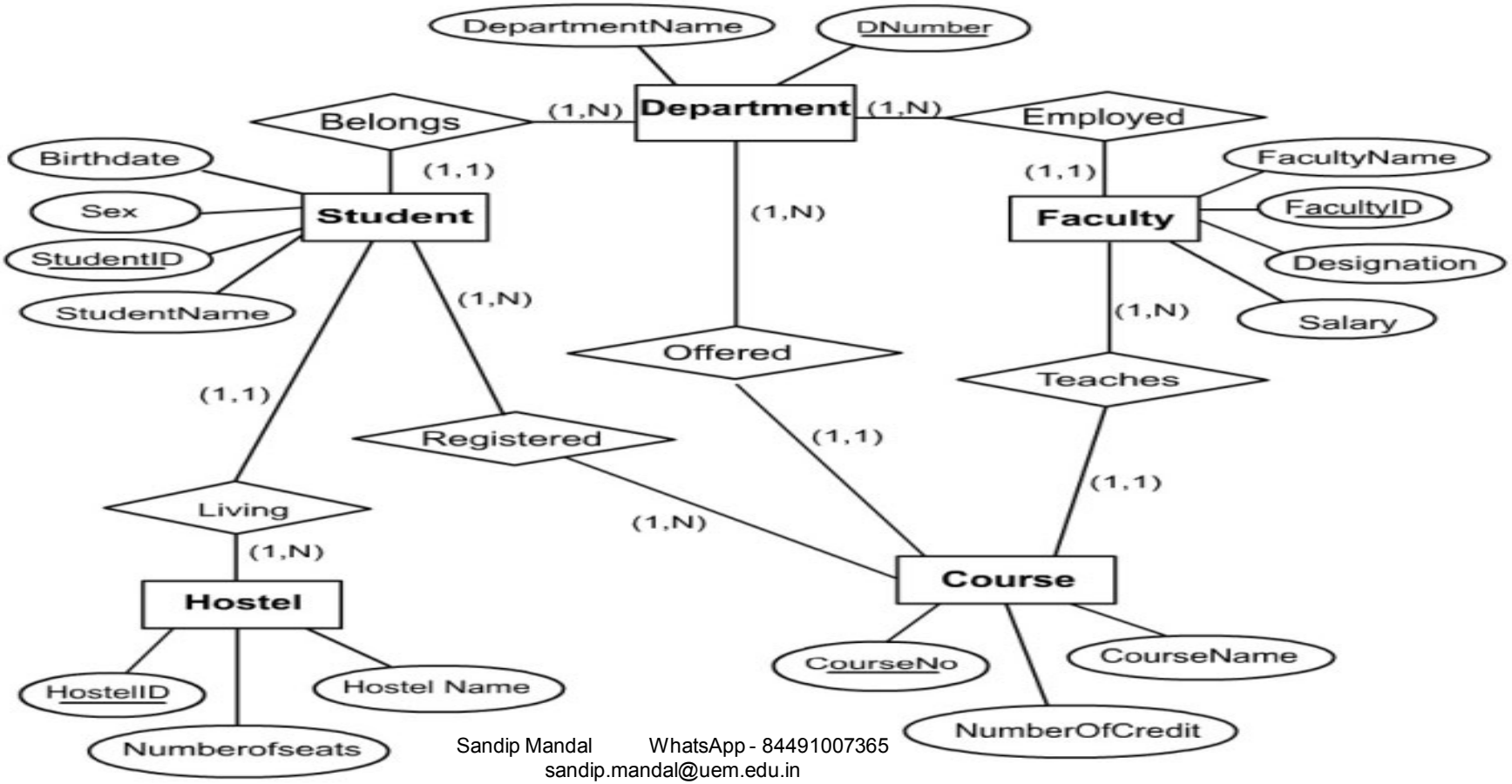
Alternate way of designing an E-R Diagram



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Thank You

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