



Figure 6.3 E-R diagram showing relationship set *advisor*.

sor. This relationship instance represents that in the university, the instructor Katz is advising student Shankar.

A relationship set is represented in an E-R diagram by a **diamond**, which is linked via **lines** to a number of different entity sets (rectangles). The E-R diagram in Figure 6.3 shows the two entity sets *instructor* and *student*, related through a binary relationship set *advisor*.

As another example, consider the two entity sets *student* and *section*, where *section* denotes an offering of a course. We can define the relationship set *takes* to denote the association between a student and a section in which that student is enrolled.

Although in the preceding examples each relationship set was an association between two entity sets, in general a relationship set may denote the association of more than two entity sets.

Formally, a **relationship set** is a mathematical relation on $n \geq 2$ (possibly nondistinct) entity sets. If E_1, E_2, \dots, E_n are entity sets, then a relationship set R is a subset of

$$\{(e_1, e_2, \dots, e_n) \mid e_1 \in E_1, e_2 \in E_2, \dots, e_n \in E_n\}$$

where (e_1, e_2, \dots, e_n) is a relationship instance.

The association between entity sets is referred to as participation; i.e., the entity sets E_1, E_2, \dots, E_n **participate** in relationship set R .

The function that an entity plays in a relationship is called that entity's **role**. Since entity sets participating in a relationship set are generally distinct, roles are implicit and are not usually specified. However, they are useful when the meaning of a relationship needs clarification. Such is the case when the entity sets of a relationship set are not distinct; that is, the same entity set participates in a relationship set more than once, in different roles. In this type of relationship set, sometimes called a **recursive** relationship set, explicit role names are necessary to specify how an entity participates in a relationship instance. For example, consider the entity set *course* that records information about all the courses offered in the university. To depict the situation where one course (C2) is a prerequisite for another course (C1) we have relationship set *prereq* that is modeled by ordered pairs of *course* entities. The first course of a pair takes the role of course C1, whereas the second takes the role of prerequisite course C2. In this way, all relationships of *prereq* are characterized by (C1, C2) pairs; (C2, C1) pairs are excluded. We indicate roles in E-R diagrams by labeling the lines that connect diamonds