

<i>ID</i>	<i>name</i>	<i>dept_name</i>	<i>tot_cred</i>	<i>course_id</i>	<i>sec_id</i>	<i>semester</i>	<i>year</i>	<i>grade</i>
00128	Zhang	Comp. Sci.	102	CS-101	1	Fall	2017	A
00128	Zhang	Comp. Sci.	102	CS-347	1	Fall	2017	A-
12345	Shankar	Comp. Sci.	32	CS-101	1	Fall	2017	C
12345	Shankar	Comp. Sci.	32	CS-190	2	Spring	2017	A
12345	Shankar	Comp. Sci.	32	CS-315	1	Spring	2018	A
12345	Shankar	Comp. Sci.	32	CS-347	1	Fall	2017	A
19991	Brandt	History	80	HIS-351	1	Spring	2018	B
23121	Chavez	Finance	110	FIN-201	1	Spring	2018	C+
44553	Peltier	Physics	56	PHY-101	1	Fall	2017	B-
45678	Levy	Physics	46	CS-101	1	Fall	2017	F
45678	Levy	Physics	46	CS-101	1	Spring	2018	B+
45678	Levy	Physics	46	CS-319	1	Spring	2018	B
54321	Williams	Comp. Sci.	54	CS-101	1	Fall	2017	A-
54321	Williams	Comp. Sci.	54	CS-190	2	Spring	2017	B+
55739	Sanchez	Music	38	MU-199	1	Spring	2018	A-
76543	Brown	Comp. Sci.	58	CS-101	1	Fall	2017	A
76543	Brown	Comp. Sci.	58	CS-319	2	Spring	2018	A
76653	Aoi	Elec. Eng.	60	EE-181	1	Spring	2017	C
98765	Bourikas	Elec. Eng.	98	CS-101	1	Fall	2017	C-
98765	Bourikas	Elec. Eng.	98	CS-315	1	Spring	2018	B
98988	Tanaka	Biology	120	BIO-101	1	Summer	2017	A
98988	Tanaka	Biology	120	BIO-301	1	Summer	2018	null

Figure 4.3 The natural join of the *student* relation with the *takes* relation.

The result of the natural join operation is a relation. Conceptually, expression “*student natural join takes*” in the **from** clause is replaced by the relation obtained by evaluating the natural join.² The **where** and **select** clauses are then evaluated on this relation, as we saw in Section 3.3.2.

A **from** clause in an SQL query can have multiple relations combined using natural join, as shown here:

```

select  $A_1, A_2, \dots, A_n$ 
from  $r_1$  natural join  $r_2$  natural join ... natural join  $r_m$ 
where  $P$ ;

```

More generally, a **from** clause can be of the form

²As a consequence, it may not be possible in some systems to use attribute names containing the original relation names, for instance, *student.ID* or *takes.ID*, to refer to attributes in the natural join result. While some systems allow it, others don't, and some allow it for all attributes except the join attributes (i.e., those that appear in both relation schemas). We can, however, use attribute names such as *name* and *course_id* without the relation names.