Example -2 : Student – Teacher

One more example to understand how to write prolog facts, rules, goals and what are their english meanings and how prolog interpreter trace through the knowledge it has been given to answer the queries.

Facts	**English meanings of Facts, Rules & Goals**
studies(charlie, csc135).	// charlie studies csc135
studies(olivia, csc135).	// olivia studies csc135
studies(jack, csc131).	// jack studies csc131
studies(arthur, csc134).	// arthur studies csc134
teaches(kirke, csc135).	// kirke teaches csc135
teaches(collins, csc131).	// collins teaches csc131
teaches(collins, csc171).	// collins teaches csc171
teaches(juniper, csc134).	// juniper teaches csc134
Rules	
professor(X, Y) :- teaches(X, C), studies(Y, C).	// X is a professor of Y if X teaches C and Y studies C. (here X is a professor, Y is a student and C is a course and X, Y, C are variables)
Queries / Goals & answers	
?- studies(charlie, What). What = csc135.	// charlie studies what? OR What does charlie study? Answer : csc135. Explanation : Here in query 'What' is a variable since it starts from uppercase letter. Again prolog will match the values from given prolog database in top-down manner and it will check the query from left-to-right. First, it will find the predicate studies, then charlie and if any value for 'What' variable would be matched then variable binding will occur. As per that prolog will return 'What = csc135' as an answer to the query.
?- professor(kirke, Students). Students = charlie; Students = olivia.	// Who are the students of professor kirke. OR kirke is a professor of which students. Answer : Students = charlie; Students = olivia.

	(here in query Students is a variable) Explanation : Here we have defined professor rule in the prolog program that - 'professor(X, Y) :- teaches(X, C), studies(Y, C). where X is a professor, Y is a student and C is a course'. So, as per that rule and given query, prolog has the value of X i.e. kirke and now prolog will try to find values for Students. For that prolog reads the right hand side of the rule and from rule and value of X it can interpret - teaches(kirke, C), studies(Y,C). Now, as prolog tries to satisfy things from left-to-right, it finds the match for 'teaches' fact and from that it has value of C i.e. csc135. Now it has - teaches(kirke, csc135), studies(Y, csc135). Now it tries to find fact for studies and from given facts prolog can find two values for Y i.e. charlie and olivia. Now, prolog may return only 'Students = charlie'. as an answer but we know that there more than one student as this query's answer. So, to get the next solution for the query, we need to type ";". But after prolog finds all the solutions and then even you will type ';' to get next solution, prolog will return 'false' because it can not find further solutions.