**Justification for normalized relational schemas**

Our conversion between our ER model and our relational model was fairly straightforward. First, we simply converted every entity in the ER model into its own relation. Next, we did the same thing with all of our relationships. We decided not to include any of our relationships inside of other tables, as otherwise we would have many null values. Overall, we simply followed the conversion algorithm discussed in class.

Below, we show that every table is in at least 3NF,

R1) Relation 1 contains our Student information. Each student is identified by their EmailAddress. All other attributes are dependent on EmailAddress, therefore our left-hand side of our functional dependency (EmailAddress → StudentName, BirthDate, Location, StudentGender) is a key (super key), satisfying the Boyce-Codd Normal Form.

R2) Relation 2 contains our Course information. Each course is identified by their CourseId number. All other attributes are dependent on this number, therefore our left-hand side of our functional dependency (CourseId → CourseName, Overview, Duration, Difficulty, Category, FAQ) is a key (super key), satisfying the Boyce-Codd Normal Form.

R3) Relation 3 contains all the information pertinent to the University. Each University is identified by the UniversityId number. The rest of the attributes in the relation are all dependent on the UniversityId number, therefore the left-hand side of our functional dependency (UniversityId → UniversityName, Description) is a key (super key) which satisfies the Boyce-Codd Normal Form.

R4) Relation 4 contains the information pertinent to an Instructor is identified by the InstructorId number, therefore the left-hand side of the functional dependency (InstructorId → InstructorName, InstructorGender, Specialization) is a key (super key) which satisfies the Boyce-Codd Normal Form. change

R5) Relation 5 contains all the information for the Transaction. All the attributes in this relation are dependent on the TransactionId, therefore the left-hand side of the functional dependency (TransactionId → Timestamp, TransactionStatus) is a key (super key) which satisfies the Boyce-Codd Normal Form.

R6) Relation 6 contains all the information of CreditCard. All the attributes in this relation are dependent on the CreditCardNo, therefore the left-hand side of the functional dependency (CreditCardNo → NameOnCard, CVV, ExpiryDate) is a key (super key) which satisfies the Boyce-Codd Normal Form.

R7) Relation 7 contains all the information of course Ratings and Comments provided by student. All the attributes in this relation are dependent on the EmailAddress and CourseId, therefore the left-hand side of the functional dependency (EmailAddress, CourseId → RateStars, Comments) is a key (super key) which satisfies the Boyce-Codd Normal Form.

R8) Relation 8 contains all the information that links all the above relations together. The CourseId number can be used to uniquely identify every attribute of that tuple. Therefore, the left-hand side of our functional dependency (CourseId → EmailAddress, UniversityId, InstructorId, TransactionId, CreditCardNo) is a key (super key), which satisfies Boyce-Codd Normal Form.