A1：

1. List nouns that are candidate classes or attributes

A： Extract relevant concept from requirements and remove the irrelevant nouns. Use nouns describe entites, which are candidate class or attributes. Here are nouns:

Faculty、course、learning module、lesson、widget、youtube video、slide、text document、raw HTML、evaluation、essay assignment、submission assignment、exam、essay question、multiple choice question、blank question、Registrar' office、sections 、less popular courses、a particular semester 、a given academic year、semester、fall、spring、full summer、summer1、summer2、student、section、course、seat capacity undergrad 、graduate、student progress 、final grade、letter grade、student feedback、everyone、username、password、first name、last name、emails、phones、addresses、benefits、tenure status、parking、bank account info、financial aid info、work-study、scholarship、students with scholarships、gpa、assignment、exam、instructor、teaching assistant

2. List verbs as candidate relations between classes

A： Find all verbs in the statement and remove the irrelevant verbs based on the nouns listed above. Then, get the verbs:

Author、contain、be broken up into、come in、be used to、create、be taught in、enroll in、register、see、teach、keep track of、verify、provide、update、keep an eye on、be broken by、go to、review

3. Generalization/specialization (inheritance, if applicable, explain)

A： This relationship can be specified as "is a"、"is a kind of". In this statement, Youtube video、slide、text document、raw HTML、evaluation are all widgets. And, fall、spring、full summer、summer1 and summer2 are all semesters. Undergrad、graduate are students. Less popular course is a kind of course. From part of my diagram, you can see this relationship better.
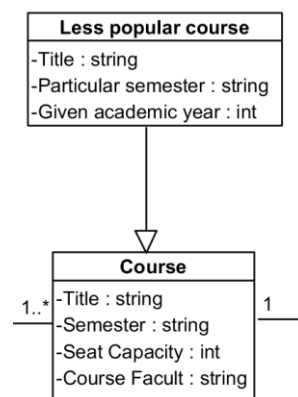

Figure 1. Generalization between course and less popular course

4. Associations, aggregation and/or composition, e.g., empty or filled in diamonds (1 to * or 1 to 1..*, if applicable, explain) - capture any lifecycle dependencies between classes using aggregation or composition

A: If two classes have some connections, we call this connection association. Usually, the verb implies one association. For example, there is an association, "enroll in ", between student and course,

Aggregation and composition mean 'subclass-class' relationships. The difference between aggregation and composition is the dependence of subclass. In aggregation, subclass or child class can exist independently of the parent class. In composition, subclass or child class cannot without the parent class.

5. Classes vs. attributes analysis

A: Class means a collection of objects and each class should have a name. Attributes are the data values of each object. For the relevant nouns, we decide it to be a class or attribute depending on the relationship. And, a noun should be attribute if we care more about the value instead of the entity. For instance, here, final grade、letter grade、student feedback are all related to student progress. Then we can set student progress as class and others as the corresponding attributes. The naïve and final class diagram will be attached later.

6. Correct data types, e.g., Date, String, Integer, List, Array, Enumeration, etc

A: Here, all the name、address、email、title should be string. Phone、year、gpa should be int. And, for finite number of instances, we can use enumeration. For example, fall、spring、full summer、summer1 and summer2 are all semesters. We can use enumerations here. For many value for an attribute, we should use array. For instance, one student can have more than one phones, which can be described by array.

7. Cardinality - for every single association, show the number of instances participating in a relation

A: Here, when there is generation/specialization, the association is always a 1-1 strong relationship. Most cardinality is 1 to 1..*, which mean a weak-strong relationship.

8. Remove any inadequate or redundant relationships, entities or attributes (if applicable, explain) - if you identify redundant associations, entities, or attributes, explain how/why you removed it. For instance, the problem statement might have irrelevant information that you might need to ignore. Also, the text might describe contradictory or ambiguous descriptions. Finally, the statement might use different terms to refer to the same thing. Make sure you make a compelling argument for your decisions to ignore a particular noun or verb as irrelevant or redundant or an overloaded term.

A: Some associations are obviously redundant, so I remove it. For instance, undergrad students can enroll in more course and students can roll in different sections for a course. Here, one student do not need to enroll in a course again after enrolling in a section. We need to remove one "enroll". Besides, the information that undergrad student can enroll more courses should be ignored since the diagram cannot describe it. Other instances are shown in the final diagram

9. Reify (if applicable, explain) - if you have association classes or other UML artifacts that don't readily map to relational schemas, explain how you transformed it to a concrete relational schema representation

A: For instance, Students have to verify their financial aid info, work-study, and scholarship. Here, by reification, just create a class student additional info to cover attributes financial aid info, work-study, and scholarship. This can make the relationship concrete.