

Requirements and Specification, ESOF 328, Spring 2020
Exam 2, April 8
Email your answers to CSchahczenski@mtech.edu by 12:20pm

Honor Code

I understand that this exam is open notes, open book and open Internet, but that I am not allowed to communicate with anyone about this exam for the duration of the exam period, aside from Dr. Celia Schahczenski. I understand that this exam was written to be 50 minutes, but that I have until 12:20pm to email my answers to Dr. Celia Schahczenski.

Signature or Typed Name (your typed name will count as your signature)

If you have any questions during this exam I will be on Discord, checking my email and available at 406-498-4884.

1. Select the best category for the information: ABET requires a mapping between student outcomes and courses. (3 pts.)
 - a. **Business rule**
 - b. User requirement
 - c. Functional requirement
 - d. Non-functional requirement which is not also a quality attribute
 - e. Quality attribute

2. A test is mapped to the functional requirement that it verifies. This would most likely be consider what type of link? (3 pts.)
 - a. Forward to
 - b. Forward from
 - c. **Backward to**
 - d. Backward from
 - e. None of the above

3. Business analyst is often a role played, rather than a job title. This role goes by many different names. Which of the following is least likely to be a synonyms for business analyst? (3 pts.)
 - a. Systems analyst
 - b. Business analyst
 - c. Requirements manager
 - d. Requirements engineer
 - e. **Systems engineer**

4. Select the best description for when use case A “extends” use case B. (3 pts.)
 - a. When use case A may or may not include use case B.
 - b. **When use case B may or may not include use case A.**
 - c. When use case A always includes use case B.
 - d. When use case B always includes use case A.
 - e. None of the above.

5. Class diagrams are used to partition a system into classes. Similarly, data flow diagrams are used to partition a system into: (3 pts.)
 - a. Scenarios
 - b. Objects
 - c. **Functions**
 - d. All of the above
 - e. None of the above

6. When writing requirements the terms “should”, “will” and “shall” all have different meanings. Give ACID example of the use of each. (6 pts.)

Shall – required functionality, system capability, something programmed into the system.

ACID example: When the user indicates a desire to create an student outcome, the system shall generate an interface that allows the user to enter a prefix, number and the text of the student outcome.

Should – desired functionality, but not required.

ACID example: The system should allow users to build customized reports.

Will – something that is true but that developers do not need to implement.

ACID example: When the user selects the grade file to upload the Windows File Selector will allow the user to browse their file system and select a file.

ACID example: When a user is authenticated by CAS, CAS will return an authentication token.

ACID example: When a user is not in the ACID user table, the system will not be able to determine the permissions for the user.

7. Describe three substantially different and useful ACID prototypes. For each prototype, clearly state its goal and why this would be useful to our class.

(Point breakdown for each prototype description:

- 1 point for the prototype being different from the others
 - 1 point for the goal of the prototype
 - 1 point for the justification of spending the effort to create the prototype)
- (9 pts.)

1. Create a UI mock-up to demonstrate the process of inputting metrics, associating them with student outcomes and/or course outcomes, and then scoring those associations for a particular semester.

Goal: Clarify requirements.

Justification: The developers don't want to put a lot of effort into facilitating the process only to find that the users don't think this is the right process.

2. Create two vertical prototypes – one that uses a web service and the other that doesn't.

Goal: Explore design alternatives making certain that the overhead of using a web services won't adversely affect performance.

Justification: The developers expect that using a web service will make the software easier to modify, but aren't sure how much overhead will be incurred by using a web service.

3. Prototype a language for customizing reports.
Goal: Verify that the language will be flexible enough to generate the types of reports users want to generate.
Justification: Building a paper prototype so users can check the feasibility of the report customization language before going to the effort of implementing the language makes sense.

The next two problems on this exam refer to the 3 updated use cases:

- Create metric
- Associate and describe metric
- Score metric association

Updates to these use cases are posted on the class website, following this exam.

In these use cases it is assumed:

- Each metric is associated with a course. Metric scores will be for the students in an offering of that course.
- Metrics can be associated with multiple PIs and COs. (Assume that the course of any CO will be the same as the course of the metric.)
- All metric associations give a threshold score for ‘exemplary’ and ‘satisfactory’. A score below the satisfactory threshold score will be considered ‘unsatisfactory’.

In completing the exam, if improvements to one of these use cases is needed, either

- show the changes to the use cases as part of the exam answer, or
- show the changes in the use cases itself.

If you make changes to the use cases, remember to mail them to me with the exam answers.

8. An assumption of the ‘Score metric association’ is that student names will be added to course offerings via an ‘Add students to offering’ use case. Write one or more functional requirements for this use case. (10 pts.)

R01. Add students to offering

Whenever a user with permission to add students to an offering is viewing an offering, and indicates a desire to add students to the offering, the system shall allow the user to add student names to the offering, either one by one or all at once via a csv file.

Rationale: The system needs to know what students are in an offering so that metrics can have scores.

Priority: High

9. Consider the use case “Score metric association”. Write all functional requirements needed for this use case. (10 pts.)

R01. Score metric association

Whenever the user is viewing a metric association for a particular course offering, and indicates a desire to score that metric, the system shall generate an interface that allows the user to enter a score for each student in the course offering.

Rationale: Metrics need to be scored to provide data for summarizing how the extent to which the associated item is met.

Priority: High

10. Add data elements to the data dictionary below to support the three use cases.
(30 pts.)

Data Element	Description	Composition or datatype	Length	Values
student outcome	Describes what students are expected to know and be able to do by the time of graduation.	prefix, identifier, text	NA	EAC 1 an ability to identify, formulate, and solve complex ...
student outcome prefix	Initials ABET uses to group student outcomes	CHAR	10	EAC, CAC, SO, EAC-old
student outcome identifier	How ABET distinguishes outcomes in same group	CHAR	5	1, a
student outcome text	Working of student outcome	VARCHAR	300	The students will demonstrate an ability to ...
performance indicator	Concrete, measurable statement of action the student should be able to perform to demonstrate attainment of student outcomes.	program abbrev, student outcome prefix, student outcome identifier, PI identifier, text	NA	Pet EAC 1 1 Is able to write clear and technically correct reports
performance indicator text	Working description of performance indicator	VARCHAR	300	Is able to write clear and technically correct reports
program	Montana Tech Engineering program	program abbrev, name	NA	GEOE Geological Engineering
program abbrev	Montana Tech acronym for a program	CHAR	5	GEOE

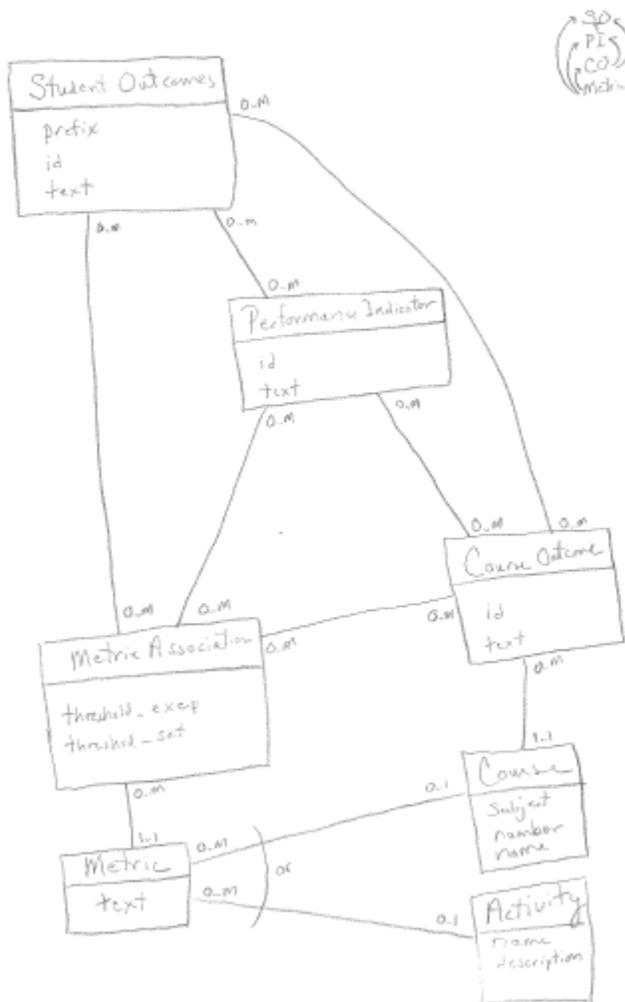
program name	Montana Tech name for a program	VARCHAR	50	Geological Engineering
course	A course taught at Montana Tech	Prefix, identifier, name	NA	ESOF 328 Requirements and Specifications
course prefix	Initials denoting department that teaches a course	CHAR	5	ESOF, PET
course identifier	Number associated with the course	CHAR	5	328, 406W
course name	Name of the course	VARCHAR	100	Requirements and Specifications
course offering	Course offering in a particular term	Course prefix, course identifier, term	NA	ESOF 328, Spring 2018
term prefix	Sessions available at Tech	CHAR	10	Fall, Spring or Summer
semester	Term in which courses can be offered	Term prefix and year	NA	Spring 2018
course outcome	Describes what students are expected to know and be able to do by the end of a course.	Course, identifier, text	NA	ESOF 328 - Requirements and Specifications R1 Students can enumerate the various types and purposes of requirements.
course outcome identifier	How a department distinguishes outcomes for the same course	CHAR	5	R1
course outcome text	Working description of course outcome	VARCHAR	300	Students can enumerate the various types and purposes of

				requirements.
metric	Item used to measure student knowledge or skills	VARCHAR	300	selected exam questions and lab exercises in GEOE 410W
metric association	Metric that will measure one or more PIs or COs	Metric, PIs[], COs[]	NA	PI 1.1 of SO1 i. Metric 1: Level I, II, and III ETS Math proficiency exam scores (average of all 3)
metric association threshold exemplary	Lowest score considered exemplary for this metric association	INT	NA	95
metric association threshold satisfactory	Lowest score considered satisfactory for this metric association	INT	NA	70
offering student	Students in a course offering	VACHAR[] (List)	30	John Brown, Jackie Buckley
metric score	Score a student earned on a metric association	double	NA	96.5

NA – Not Applicable, used for composite fields

11. Create a data model (UML class diagram without the operations, an Entity-Relationship diagram, or a Chen model) showing the different data elements that need to be tracked by the system and their relationships, one to the other. This is not an attempt to design the database, but an attempt to communicate to the database designers what we have capture during our client meetings. (20 pts.)

One Department
Fairly static data



One Semester

Dynamic

