Koan Holloway Consulting

Analysis Exercise

Online Registration System

Version 0.2

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Author: Andrew Kouroupis

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Revision History

Date	Version	Description	Author
12/08/2009	0.1	Initial Draft	Andrew Kouroupis
1/27/2010	0.2	Revised	Andrew Kouroupis

Analysis Task: Online Registration System

1. Analysis Task Description

This document was produced in the context of an actual pre-employment analysis exercise in 2009 to demonstrate the capabilities of Andrew Kouroupis applicable to a Senior Business Analyst consulting role.

The exercise presents a common SDLC scenario whereby a business group has delivered unstructured business requirements to an IT group, requesting and defining system enhancements to address a business problem.
The BA task in this scenario is to analyze and elaborate business requirements, raise questions and assumptions, and present the analysis in a structured, UML-based format. Analysis outcomes offer input to other deliverables, including a "Business Vision" document for business stakeholder agreement of business problems, process improvement goals, and acceptable outcomes -- at which point realistic project scoping can commence.

The following conditions and (fictional) business requirements constitute analysis exercise parameters:

- Produce a use case survey
- Produce one detailed use case
- Make assumptions as necessary.

2. Initial Requirements from Business Stakeholders

"Ethos College" is planning to develop a new on-line Course Registration System. The new web-enabled system replaces its much older system developed on mainframe technology. The new system allows students to register for courses from any Internet browser. Professors use the system to register to teach courses and record grades. Because of a decrease in federal funding, the college cannot afford to replace the entire system at once. The college will keep the existing course catalog database, where all course information is maintained. This database is an Ingres relational database running on a DEC VAX. The legacy system performance is poor, so the new system accesses course information from the legacy database but does not update it. The registrar's office continues to maintain course information through another system.

Students can request a printed course catalog with course offerings for the semester. Students can also obtain the course information on-line at any time. Information about each course, such as Professor, department, credit hours, and prerequisites, assists students in making informed decisions. The new system allows students to select four course offerings for the coming semester. Each student indicates two alternate choices in case they cannot be assigned to a primary selection. Course offerings have a maximum of ten and a minimum of three students.

The registration process closes on the first or second day of classes for the semester. Any course having fewer than three students enrolled on the day registration closes is cancelled. All courses without an Professor on the day registration closes are cancelled. Students enrolled in cancelled classes are notified that the course has been cancelled, and the course is removed from their schedules. The registration system sends information about all student enrollments to the Billing System so that the students can be billed for the semester. For the first two weeks of the semester, students are allowed to alter their course schedules. Students may access the on-line system during this time to add or drop courses. Changes in schedules are immediately sent to the Billing System so that an updated bill can be sent to the student.

At the end of the semester, the student can access the system to view an electronic report card. Since student grades are sensitive information, the system must employ security measures to prevent unauthorized access. All students, Professors, and administrators have their own identification codes and passwords. Professors must be able to access the on-line system to indicate which courses they want to teach. They also need to see which students signed up for their course offerings. Professors can record the grades for the students in each class.   (End)

3. Business Requirements Refactored

Ethos College plans to develop a new Online Registration System (ORS). Phase One of the new system is to web-enable a 12-year-old Course Registration Terminal (CRT) mainframe system (DEC VAX), which currently requires registrations to be keyed by university staff on office terminals.

- The College will retire the legacy Registration System hosted on the DEC VAX.
- The College will continue the Ingres-based Course Catalog Database (CCDB) and Student Records System on the DEC VAX.
- The Registrar's office will continue to load and maintain Course Catalog and Student Records via legacy system terminals.
- The Registrar's office will cease conducting registration via paper request and terminal data entry.
- The Registrar's office will continue to offer a printed course catalog for each semester, available upon request.

The new Online Registration System (ORS) will provide the following functionality

1. ORS will provide secure login and other security measures and levels adequate to protect sensitive student information.
2. The new system will access all course information from the legacy catalog database (CCDB) but will not update it.

   ORS will allow each Instructor to:

3. Register to teach courses.
4. View a student roster for courses they are teaching.
5. Record student grades for their classes.

   ORS will allow each student to:

6. View course information for the coming semester 24/7 from any Internet-enabled browser.
7. Request courses and modify their schedule throughout the Registration period.
8. Select up to four primary course offerings, and up to two alternate choices to substitute for unavailable primary choices.
9. View their course schedule from start of Registration to the end of the current semester.
10. Receive email and ORS on-screen notification of cancelled classes for which they were registered.
11. Receive billing for courses at the beginning of the semester, also updated billing for enrollment changes.
12. View their grades at the end of the current semester -- an electronic report card.

    ORS will allow Registrar staff to:

13. Confirm Instructors' registration for teaching assignment and maintain CCDB Instructor data.
14. Conduct administrative student registration and adjustments to course enrollments.

    Registration Fulfillment and Billing System Integration

15. ORS will automate fulfillment of student registration requests according to course availability, at a maximum of ten students per course -- or substitute alternate choices as available.
16. When registration has closed, each course without an assigned Instructor, or with fewer than three students enrolled, will be automatically cancelled.
17. When a course is cancelled, each student enrolled in the class will be automatically notified and the course removed from their schedule.
18. At the start of the semester, ORS will automatically send all enrollment data to the Billing System. Each student will be billed for the semester at that time.
19. For the first two weeks of the semester, students will be able to access ORS to add or drop courses. During that period, ORS will immediately send schedule changes to Billing, which then will send updated student bills.

   **Student Records System Integration**

20. ORS will automatically send student course outcomes data to the Student Records System for student record update.

4. Assumptions Derived from Requirements

The following assumptions reflect anticipated requirements, business objects and business processes not explicitly reflected in the received business requirements. This is typical of further consulting and requirements elicitation needed when working with a client's initial business system requirements.

Assumptions	To Be Determined
1. There are requirements for Instructor to enter grades into the new system and display grades to students. However, no system was identified regarding student records, to which course completion outcomes must be updated.	Billing System location .
2. Also, the Course Catalog Database provides insufficient justification for retaining the DEC VAX mainframe system. Therefore, it is assumed that the legacy mainframe hosts the Billing System and Student Records System.	Student Record System location.
3. Update to CCDB performed in "another system" than the new system is assumed to be retention of legacy practice.	Confirm CCDB maintenance process.
4. Instructor submission of class request to teach would need to be reconciled in ORS (confirmed or cancelled) and then maintained in CCDB	Confirm business process for teaching assignments
5. Registrar is expected to need normal administrative access to the registration system to conduct schedule overrides, etc. outside the Registration process.	Confirm requirements for administrative access.
6. Statement "Because of a decrease in federal funding, the college cannot afford to replace the entire system at once" does not fit a requirement model. Stated instead assumed to be a phased implementation for various reasons. (Assumed names of legacy systems for descriptive purposes.)	Determine what future changes are planned that will impact must be considered regarding decisions in Phase One.
7. Statement that the course catalog "assists students in making informed decisions" does not seem to be a requirement beyond that provided by the current course catalog data model. It is assumed that revision of the course catalog data model is not required.	Determine if the current course catalog data model is sufficient to support student decision goals regarding class selection.
8. Statement that "the registration process closes on the first or second day of classes for the semester" and "for the first two weeks of the semester, students are allowed to alter their course schedules" seems seem to imply a continuous Registration process that ends after two weeks of classes. The requirement is assumed to be for one Registration Start Date prior to start of the semester and one End Date set for two weeks after classes start.	Determine a difference (if any) in registration functionality before vs. during two weeks of classes -- or if Registration is interrupted in any way at start of the semester.
9. Assumed that not all teaching staff would be Professor ranked. Adopted actor name "Instructor" instead, as more correctly inclusive.	Confirm assumption.

5. Use Case Survey Model
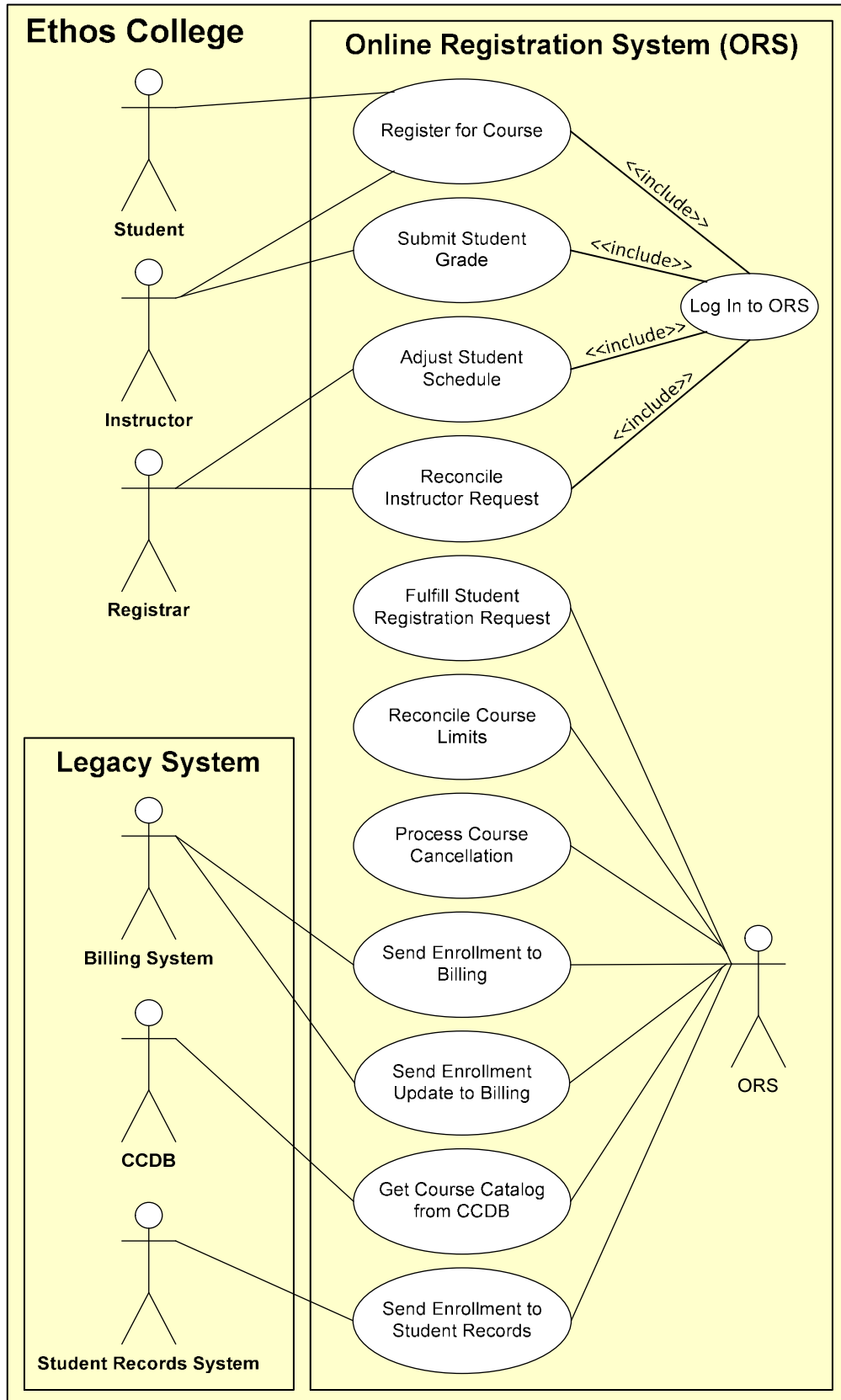
6.   Catalog of Actors

The following are Actors derived or assumed from the business requirements.

Actor Name	Description
1. Ethos College	Business system domain.
2. Online Registration System (ORS)	New system under discussion. Provides a browser-based Registration interface for students, instructors, and staff.
3. Instructor	ORS User with "Instructor" security profile for system access (current teaching employee).
4. Student	ORS User with "student" security profile for system access (currently admitted student).
5. Registrar	ORS User with "registrar" security profile for system access (authorized registrar office staff).
6. Course Registration Terminal (CRT)	Legacy system used by WC staff to maintain and print a course catalog, register students for classes, and assign grades. DEC VAX.
7. Course Catalog Database (CCDB)	Ingres 6 (open source) relational database on DEC VAX, legacy system.
8. Billing System (BS)	Resides on DEC VAX, legacy system.
9. Student Record System (SRS)	Resides on DEC VAX, legacy system.

7.   Use Case Survey

The following use cases are derived from business requirements. Legacy use cases are excluded.

Use case	Description	Actors
1. Log In to ORS	Student/Instructor/Registrar Log In and are granted access to ORS feature sets according to security profile. Student: View Course Catalog, Submit Course Registration, View Course Schedule, View Grades. Instructor: View Course Catalog, View Course Registration, View Class Rosters, Submit Grades. Registrar: View Course Catalog, View/Submit Course Registration (for Student, Instructor), View/Update Grades. Task Goal: ORS present features appropriate to security profile.	• ORS • Student • Instructor • Registrar
2. ORS Get Course Catalog from CCDB	ORS gets the current update of course information from the legacy catalog database (CCDB) for display. (Note: ORS does not update CCDB.) Task Goal: CCDB gets confirmation of data successfully received.	• ORS • CCDB
3. Instructor Register for Course in ORS	(Logged-in) Instructor registers to teach courses and view assigned courses. Task Goal: Confirmed registration of classes to teach.	• ORS • Instructor
4. Student Register for Course in ORS	(Logged-in) Student requests courses and modifies their schedule throughout the Registration period. (Student can select up to four primary course offerings, and up to two alternate choices.) Task Goal: Confirmed registration for courses.	• ORS • Student
5. Registrar Reconcile Instructor Request in ORS	(Logged-in) Registrar views an Instructor's class choices and confirms or denies choices. ORS updates the Instructor view of assigned classes. Task Goal: Instructor class registration choices confirmed.	• ORS • Registrar
6. Adjust Student Schedule in ORS	(As a required administrative function, logged-in) Registrar adjusts student course schedule. Task Goal: Confirmation of update.	• ORS • Registrar
7. ORS Fulfill Student Registration Request	ORS fulfills student registration requests according to course availability, at a maximum of ten students per course -- or substitutes alternate choices as available. Task Goal: Execution of all applicable fulfillment rules.	• ORS
8. ORS Reconcile Course Constraints	(When registration has closed) ORS cancels each course with no Instructor, or with fewer than three students enrolled. Task Goal: Course cancelled according to course limit rules.	• ORS
9. ORS Process Course Cancellation	(When a course is cancelled) ORS notifies each student enrolled in the class , and ORS removes the course from their schedule. Task Goal: Student notified and schedule updated.	• ORS • Student

Use case	Description	Actors
10. ORS Send Enrollment to Billing	(At the start of the semester) ORS sends all enrollment data to the Billing System. Task Goal: Confirmation from Billing of all enrollment data successfully received.	• ORS • Billing System
11. ORS Send Enrollment Update to Billing	(During the first two weeks of the semester, when a schedule is modified by add/drop) ORS sends schedule change to Billing. Task Goal: Confirmation from Billing of update enrollment update data successfully received.	• ORS • Billing System
12. ORS Send Enrollment to Student Records	ORS sends student course outcomes to the Student Records System. Task Goal: Confirmation from Student Records system of course outcome data successfully received.	• ORS • Student Records

8.   Legacy Use Cases

The following use cases reflect legacy system current practice as expressed or assumed in business requirements.

Use Case	Description
1. Load Course Catalog in CCDB	Registrar's Office staff load a course catalog for each new semester.
2. Update Instructor Assignment in CCDB	Registrar's Office staff updates the CCDB Instructor/Course data.
3. Assign Class to Instructor in CCDB	Registrar staff updates CCDB Class-Instructor data.
4. Register Student	Terminal-based (staff) process to be retired in favor of web-based process.
5. Bill Enrollment from BS	Billing System bills (at that time) each student for the semester.
6. Bill Enrollment Update from BS	Billing sends student an updated bill.
7. Update Student Record in SRS	Student Records updates the Student History record.

9. Detailed Use Case: Log In to ORS

9.1 Use case Description

In this use case an authorized user successfully logs into the Online Registration System.

A user wishing to access the ORS system navigates in an internet web browser to the ORS web address, enters a username, enters a password. ORS executes access rules applicable to the security profile indicated by the user's unique username. ORS allows access. ORS presents system features, constraints, and rights applicable to the security profile.
The following system features are presented depending on security profile:

- Student: View Course Catalog, Submit Personal Course Registration, View Own Course Schedule View Own Grades

- Instructor: View Course Catalog View Own Course Registration View Own Class Roster, Submit Own Student Grades

- Registrar: View Course Catalog View/Submit All Course Registration (for Student, Instructor), View/Update All Grades

Trigger: User intention to access the ORS

Task Goal: At completion of Login, ORS presents system functionality appropriate to the user's security profile.

9.2 Use Case Model: Log In to ORS

9.3 Actors

System: Online Registration System (ORS)

Authorized User:
- Student or
- Instructor or
- Registrar.

9.4 Basic Flow

9.4.1 Use Case Begins
This use case begins when a user navigates to the ORS web site for the purpose of accessing the ORS system.

9.4.2 Submit Username and Password
User submits a username and password.

9.4.3 Validate Login
System validates that the username and password identifies an authorized user.

9.4.4 Identify Security Level
System identifies the security level: system constraints and rights applicable to user's security profile.

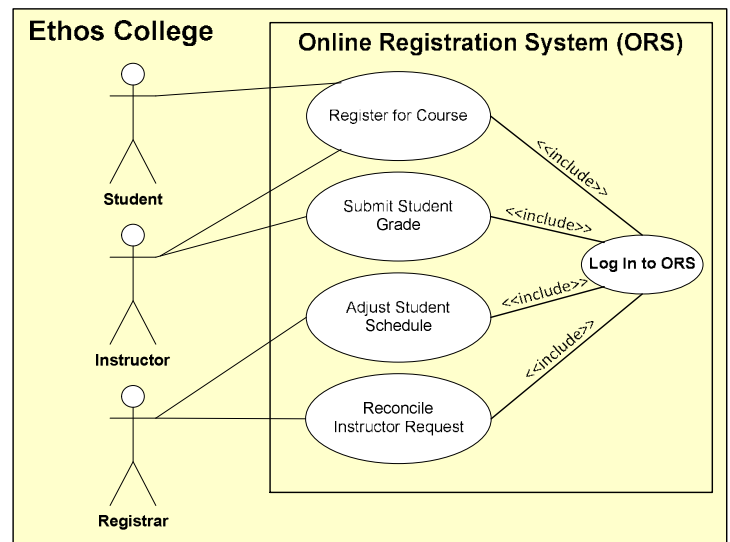### 9.4.5 Identify Individual Access Constraints
System identifies access constraints and rights unique to user.

9.4.6 Present Features
System presents system features representing all system access constraints and rights applicable to user.

9.4.7 End Use Case
The use case ends with successful login to a default system feature, depending on user profile.

9.5 Alternative Flows

9.5.1 **Username Not Found**

At Basic Flow step "Validate Login" a submitted username is not found in the system.

System displays an error message that the username is not found – refer to Registrar's Office.

In subsequent attempts, if user cannot supply a valid username, then the use case ends.

9.5.2 **Password Not Valid**

At Basic Flow step "Validate Login" a submitted password cannot be validated against a valid username (username in the system).

System displays an error message that the username/password do not match – refer to Registrar's Office.

If user cannot supply a valid password for the valid username, then the use case ends.

9.6 Preconditions

Basic flow success requires a user to have a valid username and password for system login.

9.7 Postconditions

None

9.8 Dependencies

All system user-driven use cases have an "include" dependency on the Login use case. Upon validation of login username and password, "UC Log In to ORS" executes user security profile and related feature presentation rules as preconditions for the following use cases:

- UC Instructor Submit Grade
- UC Student Register for Course
- UC Instructor Register for Course
- UC Registrar Reconcile Instructor Request
- UC Registrar Adjust Student Schedule

9.9 Scenarios

9.9.1   Successful login: username and password are valid first try, success.

9.9.2   Username not valid, user retries and is invalid, fail.

9.9.3   Username not valid, user retries and username is validated.

9.9.4   With valid username, password not valid, user retries and is validated, success.

9.9.5   With valid username, password not valid, user retries and is invalid, fail.

10.   Appendix: Analysis Draft Products for Other Artifacts

The following are intermediate results from the analysis of a business requirements. These draft materials are conserved here for input to other analysis products. Material in this section is not to be updated in this document.

10.1   Glossary Terms

The following draft glossary terms are derived from the business system description.

Name	Description
1. Ethos College (WC)	System domain
2. Course Registration Terminal (CRT) system	Legacy system used by WC staff to maintain and print a course catalog, register students for classes, and assign grades.
3. Course Catalog Database (CCDB)	Ingres 6 (open source) relational database running on a DEC VAX
4. Student Records System (SRS)	Legacy system for student records.
5. Billing System (BS)	Legacy system for student billing.
6. Bill Date (BD)	Date on which ORS opens enrollment data to the Billing System.
7. Online Registration System (ORS)	New system under development. Provides a Web interface to allow students to self-register for courses in the coming semester.
8. ORS Username (ORS-ID)	Student ID for students Employee ID for university employees
9. ORS Password (ORS-PW)	Password assigned by registrar office.
10. Instructor	ORS User with "Instructor" security profile for system access (current teaching employee).
11. Student	ORS User with "student" security profile for system access (currently admitted student).
12. Registrar	ORS User with "registrar" security profile for system access (authorized registrar office staff)
13. Course	ORS System object referring to a specific Course offering (for example, EDS101 section 1 and EDS101 Section 2 are two instances of "course").
14. Class	"Class" is reserved for references to modeling of the system static domain. This term is superseded by "Course" in all references to course offerings.
15. Coming Semester	The semester currently open for registration.
16. Course – Primary Choice (P-1, P-2, P-3, P-4)	Student selection of 1 to 4 courses as primary choices for registration. The system will attempt to fulfill all first choices before substituting "alternative" choices.
17. Course – Alternate Choice (A-1, A-2)	Student selection of 0 to 2 courses to be substituted for one or more unavailable "first" choices: "Alt-1" then "Alt-2"
18. Business Rule (BR)	An operational system constraint that must be executed when conditions for the rule occur.
19. Close of Business (COB)	A time of day (i.e. 10:00 PM, as determined by the University) when the system executes all applicable rules with a COB condition.
20. Start of Business (SOB)	A time of day (i.e. 12:00 AM, as determined by the University) when the system executes all applicable rules with a SOB condition.

10.2 Business Rules

The following draft business rules are derived or assumed from the business system description.

Rule Name	Description
1. Registration Control - Open	After SOB on Registration Start Date and before COB on Registration End Date, ORS shall allow student login, course catalog view, and course selection update.
2. Registration Control - Closed	After COB on Registration End Date, ORS shall allow student login, course catalog view, and current registration view; ORS shall lock course selection update.
3. Course Selection Alternate	In each registration session, ORS shall allow selection of 0 to 2 courses as "alternate" choices if initial choices are unavailable.
4. Alternate Course Priority	Student alternate courses must indicate order of preference for replacement of first choices (Alt-1 then Alt-2).
5. Course Fulfillment Order	ORS shall register each student for indicated courses in this order: IF available, any and all (1-4) of "primary" choices; THEN "alternate 1" IF available; THEN "alternate 2" IF available.
6. Course Fulfillment Limit	ORS shall register each student for 0 to 4 courses per semester as a Product of course selections, course availability, and course fulfillment order.
7. Course Drop	On subsequent student logins prior Registration End Date, ORS shall allow 1 or all courses to be deselected for registration.
8. Registered Course Indicator	On subsequent student logins during the allowed registration period, ORS shall indicate all previously selected courses for which the student has been registered.
9. Course Reselection	On subsequent student logins during the allowed registration period, ORS shall allow course selection according to the limits of initial registration.
10. Course Display	ORS shall display all courses for selection as available for the coming semester.
11. Course Selection First	ORS shall allow selection of 1 to 4 courses as "first" choice for registration.
12. Registration Open	At SOB on Registration Start-Date, ORS shall enable class selection.
13. Registration Close	At COB on Registration End-Date, ORS shall disable class selection.
14. Course Roster Minimum	At COB on Registration End-Date, IF a course has 0 to 2 enrollments, THEN ORS shall cancel the course.
15. Course Instructor Limit	At COB on Registration End-Date, IF a course has less than 1 instructor, THEN ORS shall cancel the course.
16. Cancel Selections	IF and When a Course is cancelled, THEN ORS shall cancel each student selection of that course (first and alternate).
17. Cancel Enrollments	IF and When a Course is cancelled, THEN, ORS shall cancel each student enrollment for that course.
18. Update Student Schedule	IF and When a Course is cancelled, THEN ORS shall update all affected student schedules as displayed.
19. Notification of Cancellation:	IF and When a Course Enrollment is cancelled, THEN, ORS shall generate a student notification of cancellation for each course cancelled
20. Update Registration to Billing	After COB on Bill Date and Before COB on Registration End Date, IF and When a course enrollment is added or changed, THEN COB shall send an update of that enrollment to the Billing System.