Course-Management System: Design Project Proposal

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ABSTRACT
A *design* project proposal for a course-management system
is presented here. Such a system allows University students
to enroll in courses, view their schedule and perform other
course-related tasks from a web portal. The proposed project
as well as suggested improvements are first explained. Four
Canadian university course-management software surveys
are then presented. Each survey has a brief description fol-
lowed by a critique of the major usability flaws and strengths.
Along with each survey, two of the most important features
of each system will be further analyzed via hierarchical task
analyses.

PROJECT PROPOSAL
Overview
The project proposed in this document is the design of a new
university course-management system. Through scrutiniza-
tion of several pre-existing systems, we will apply design
concepts discussed in class to determine what features and
design choices are crucial to the success of a course- man-
agement system's design.

It is commonplace for educational institutions to have one
central course- management system which hosts all tools and
information that students and staff may need to access. This
includes tools to allow students to enroll in courses, view
their schedule and view other course-related information.
Additionally there are a variety of other tools to perform
financial and administrative tasks, however this project's
scope is focusing only on the course-related functions.

Course-management systems have achieved near omnipres-
ence in the world of education, but there remains significant
variability in their design, structure, and functionality. It is
our goal to take the best aspects of the existing systems as
well as consider the most prominent criticisms to develop a
protoype of a new system.

In the following section we will introduce several possible
improvements that could be made to these systems, informed
by the system surveys below. It is these suggestions that we
plan to incorporate into prototypes for later milestones.

Suggested Improvements to Existing Systems
There are a variety of improvements that could be made
to course-management systems when compared to existing
products. The software surveys identify several key areas of
weakness, and solutions to these are presented below.

Dynamic Element
One of the highlighted points of weakness in all the sys-
tems surveyed is the ability to surface the most relevant data
to the user quickly and consistently. To improve this aspect,
the concept of an intelligent, "dynamic" element is proposed.
This prominent element will be the first thing users see when
accessing the webpage. Several factors including the current
date and enrollment status will be used to determine which
task the user is most likely to perform.

For example, when the user accesses the system during exam
season, the element will display the student's exam sched-
ule. During the course registration period, the element will
display information related to course registration. If a user
is not yet accepted into University, the element will display
their application status.

This dynamic element will help users quickly find the in-
formation they are looking for by making information more
visible and easier to access. If the user wishes to perform a
less common task, all functions will continue to be displayed
below in a static and consistent manner.

Improved Navigation
Many tasks performed by users of course-management soft-
ware are broken into several steps. A weakness of the ex-
isting products is in visually showing the user at which step
they are at. A proposal to improve on this is to include a
navigation element when the user is engaged in a multi-
step task. This element would show which step the user is
currently on, and would include the ability to go back to a
previous step, or jump ahead to the first uncompleted step.

This visual indicator would improve the user's comprehen-
sion of how the system works, and would give them the abil-
ity to better navigate between steps. It would also improve
user satisfaction, as they are less likely to become impatient
when they know exactly how many steps they have com-
pleted and how many remain.

Smarter Schedule Generation
Currently, the general process for selecting lecture, tutorial,
and lab times when enrolling in courses can be broken down
into the following steps. First, the user selects their desired
and required courses. Secondly, they manually select times
for each course, and the system generates their schedule.
After viewing their schedule, users often have to go back
and switch times to ensure there are no conflicts, or may
wish to change times to have a more desirable schedule.

One important goal of the project is to simplify this process by employing a more intelligent schedule generating system.

After the users selects their desired and required courses, the system will generate several different timetables based on those courses. It will display all timetables that don't have any conflicts. These will be ordered based on perceived "desirability", which will be judged based on several factors including gaps between classes and start / finish times. The user will be able to filter certain schedules based on their own requirements and wishes, such as schedules that end after a certain time.

Implementing such a system would simplify one of the more tedious processes a user must perform, and will result in better schedules for users.

SOFTWARE SURVEY

Four course-management systems from Canadian universities have been selected for review. For each system, a brief description will be followed by a critique of the major usability flaws and strengths. From this, the main goals and tasks of users using the systems will be extracted. Finally, the two most important of those features will be further analyzed via hierarchical task analyses. Screenshots will be presented to reinforce the arguments in the critique for each software review.

McMaster University – Mosaic
Description
The purpose of the software is to allow students to manage their courses (enrolling, dropping etc.), and view information about their current status (current timetable, enrollment status, financial balance etc.). The main interface for the software consists of several collapsible modules encapsulating different aspects of the software in a main column. These include Academics, Finances, Personal Information, and Admissions. A small column to the right holds less common sections, such as Enrollment Dates and Graduation. The focus of this analysis is on two common tasks – enrolling in courses and viewing one's course schedule.
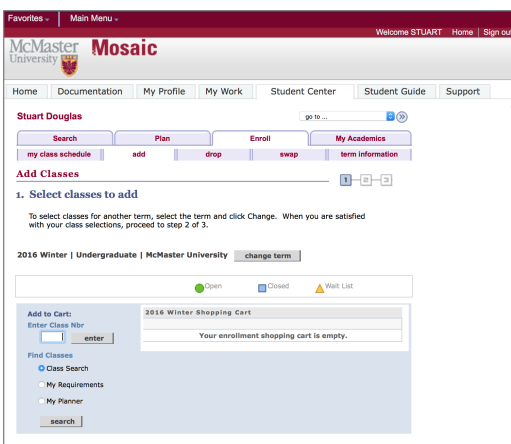

Figure 1: Selecting courses to enroll in – Mosaic

Critique
The largest usability flaws in Mosaic center around difficulty to access required information. Combined with an unintuitive and inconsistent navigation interface, the software is . The HTA for enrolling in a course demonstrates this through the large number of steps required to perform a routine and common task. Other functions are hidden behind dropdown menus, and are difficult to discover.

The navigation is separated into a top navigation bar separated by user-type (e.g. Students and Employees). Within the student center page, functions are separated into modules, an effective strategy to group related functions. Navigating to one of the sub-functions (such as enrolling in a course) presents secondary and tertiary menus below the main one. Navigation within one of these is handled by blue text hyperlinks back to previous pages. Native back and forward browser functionality does not work. There is little visual indication of where the user is beyond the navigation bars at the top, which do not go to a depth sufficient to cover all pages used when performing common actions, such as enrolling in a course.

Guelph University – WebAdvisor
Description
Guelph University's course enrollment software, WebAdvisor, provides a variety of functions for students to manage their courses. The student page interface contains two columns – a main column with course-related news, and a righthand column with links to each of the functions (Register for Courses, View Schedule etc). These "function" pages are one column, and may contain several sub-pages as processes are broken into steps. Navigating between sub-pages is done using native browser back and forward buttons. If an error occurs, such as no courses found for specific search criteria, a large box is displayed with information about the error and the option to search for a solution.
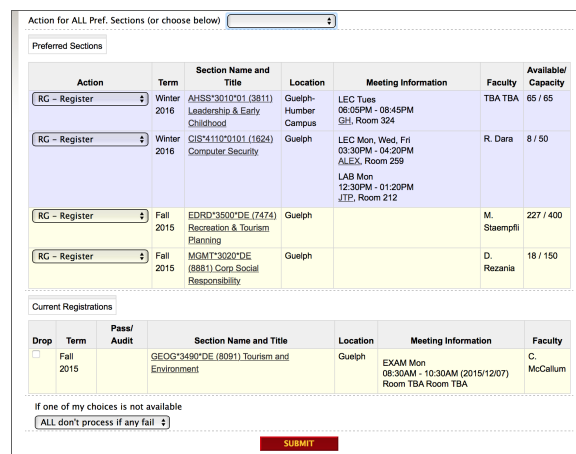

Figure 2: Registering for preferred courses – WebAdvisor

Critique

There are a variety of usability issues associated with WebAdvisor that could be improved upon, especially in the area of navigation. There are also certain strengths to the system as compared to others surveyed. The navigation issues largely stem from a lack of consistent navigation elements to show the user where they are. For example, when enrolling in a course there are several steps that must be completed (refer to HTA – WebAdvisor, Enrolling in A Course). The user is not aware how many steps there are total, how many they have completed or how many remain. Another large usability issue is an inefficient use of space on the main page. The visibility of important functions is reduced by putting all functions in a small column to the right of the main content. This main content contains news items, such as exam period times and service outages, generally information that the user is less likely to need than the functions beside it.

WebAdvisor does do some things quite well from a usability perspective however. One of the most common tasks is enrolling in a course, and WebAdvisor has the most streamlined process of all universities surveyed. Although it is not always clear at which step the user is at as discussed above, the process is straightforward and contains much fewer steps than performing a similar task using a different system.

Carleton University – Central
Description

Central is the course-management system for Carleton University. It has a similar feature-set to the other systems surveyed. This includes allowing users to enroll in courses and view their schedule. The user interface for Central primarily is based on text links to different pages, with very little use of icons or colour. The main student page is a one-column list of text links to the various student-related categories of functions. A tab bar at the top lets the user switch between different sections of the system including Student Services and Employee Services.

Figure 3: Add courses view – Central

Critique

There are a large number of prominent usability flaws in Carleton University's Central course-management system. Visibility of common functions on the main page is very low, as a long list of hyperlinks contains all the categories (e.g. Registration, Student Records etc) requiring the user to read each one until they find the correct one. Once a category is selected, then another list of hyperlinks to each of the functions in that category is shown (see figure 4). Again, the user must read through each one until they find the desired function.

Figure 4: Registration main page – Central

Another large usability flaw is the poor mapping between many actions. For example, when adding a course, the user first enters a course number into one of several (unlabeled) input boxes, and then they click the Submit button (see figure 3). The submit button is aligned with other buttons for Class Search, which takes the user to a separate page, Reset, which undoes their changes, and Return to Worksheet which navigates the user to a page showing them their preferred courses. These buttons are not all related, and grouping them together may confuse the user.

Overall, Central is a relatively unintuitive system, requiring users to spend more time finding the information they need through poor mappings and a lack of a visual hierarchy.

Waterloo University – Quest
Description

The Quest system is designed to let students manage several aspects of their university enrollment, such as course management, financial inquiries, and contact information. Students can also sign up for a GO Bus pass, view their grades and transcript, and check the status of scholarships and other applications. The main page is broken up into 8 collapsible sections, 4 main sections (Academics, Finances, Personal Information, Admissions) with another 4 sections in a sidebar (Holds, Finance Information, Academic Information, Other

Useful Links). The critique will focus on enrolling in courses and viewing a user's course schedule.
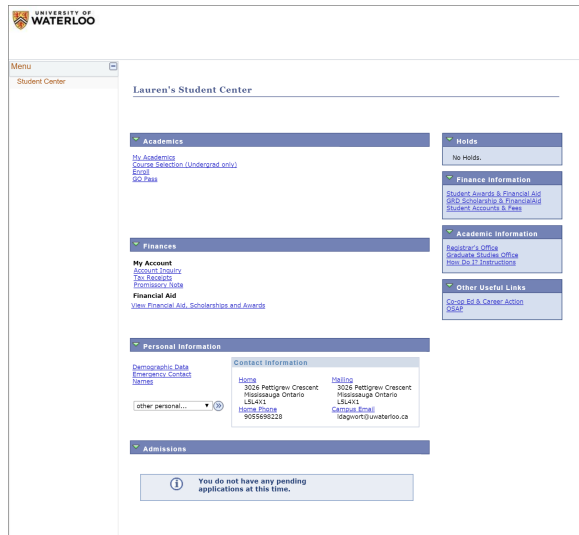
Figure 5: Student main page – Quest

Critique

Quest has some major usability issues when it comes to providing the user to information and functions they can use. The system is notorious for hiding options and menus from the user, requiring several screens of drill down menus before being able to access any meaningful options. The menus look unfinished or poorly formatted, and it is easy to become lost and confused while navigating the various pages. Navigation on the main page is done using hyperlinked text, while traversing the deeper options is done using blue menu tabs. Native browser back and forward commands generally work as expected, which makes navigation a little more manageable.

CONCLUSION

We have discussed several proposed improvements to a course-management system. These include a dynamic element highlighting the most-needed feature based on several factors, an improved layout with better indicators, and a more intelligent course scheduler. We have also provided a software survey for four Canadian university course-management systems. For each survey we critiqued the software as well as analyzed the two most important features via hierarchical task analyses, presented at the end of this paper.

HTA - MOSAIC, ENROLLING IN A COURSE

0. Enroll In Course

- **1. Click *enroll* in the Academics section**

- **2. Select term**
  - 2.1 Choose desired term from radio button
  - 2.2 Click continue

- **3. Select course** — Either of 3.1, 3.2, 3.3 or 3.4
  - **3.1 Manually enter course number**
    - 3.1.1 Enter course number in *Class Nbr* field
    - 3.1.2 Click *find* button
  - **3.2 Select *Class Search***
    - 3.2.1 Click *search* button
    - 3.2.2 Enter *search* criteria
    - 3.2.3 Click *select* button for desired course
  - **3.3 Select *My Requirements***
    - 3.3.1 Click *search* button
    - 3.3.2 Click *select* button for desired course
  - **3.4 Select *My Planner***
    - 3.4.1 Click *search* button
    - 3.4.2 Click *select* button for desired course

- **4. Select Lecture and tutorial timeslot**
  - 4.1 Click *select* button on desired lecture time
  - 4.2 Click *select* button on desired tutorial time (if applicable)
  - 4.3 Click *select* button on desired lab time (if applicable)

- **5. Click *next* button**

- **6. Click *Proceed to Step 2 of 3* button**

- **7. Confirm courses to add**
  - 7.1 Check that classes to enroll in are correct
  - 7.2 Click *Confirm Enrollment* button

HTA - MOSAIC, VIEWING WEEKLY SCHEDULE

0. View weekly schedule

1. Click *View Weekly Schedule* button

2. Select desired week

3 Press *refresh* button to update view

Either 2.1, 2.2, or 2.3

2.1 Input date in *Show week of* field

2.2 Use *previous week* and *next week* buttons to navigate to desired week

2.3 Select from Calendar popup

2.3.1 Click calendar button

2.3.2 Click calendar button

2.3.3 Select desired Month and Year from dropdown

2.3.4 Select day in desired week

HTA - WEBADVISOR, ENROLLING IN A COURSE

0. Enroll in a Course

1. Click *Search / Register* button

2. Select term from dropdown menu

3. Choose search criteria

4. Check desired course

5. Select *Register* from the dropdown for the course

6. Press *Submit* button

3.1 Choose desired course subject from dropdown

3.2 Choose course level from dropdown

3.3 Press *Submit* button

HTA - WEBADVISOR, VIEWING WEEKLY SCHEDULE

0. View weekly schedule

1. Click *Class Schedule* button

2. Select term from dropdown menu

3. Press *submit* button

4. Press *Class Schedule Grid* button

HTA - CENTRAL, ENROLLING IN A COURSE

0. Enroll in a Course

1. Click the Registration link

2. Click the Registration Changes link

3. Select term from dropdown

4. Press Submit button

5. Select desired courses

Either of 5.1, 5.2

5.1 Search for course

5.1.1 Click Search button

5.1.2 Enter search criteria

5.1.3 Click Search button

5.1.4 Select desired course checkbox

5.1.5 Click Proceed to Worksheet button

5.2 Enter course number manually

5.2.1 Enter course number into input field

5.2.2 Click Add Course(s) button

6. Click Proceed to Registration button

7. Click Submit button

HTA - CENTRAL, VIEWING WEEKLY SCHEDULE

HTA - QUEST, ENROLLING IN A COURSE

```
0. Enroll in a course
    |
    +------------------------------+
    |                              |
1.1 Click on the "My          1.2 Click on the
Academics" link               "Enroll" link
    |                              |
1.1.1 Click on the            2. Click on "add" sub-      3. Select desired        4. Select "Proceed to      5. Select "Finish
"Enroll" tab                  menu tab                    course (via either 3.1   Step 2 Of 3"               Enrolling"
                                                          or 3.2)
                                                              |
                                          +-------------------+-------------------+
                                          |                                       |
                                    3.1 Manually enter                      3.2 Use course
                                    course number                           search engine
                                          |                                       |
                                    3.1.1 Enter course                      3.2.1 Click "Search"
                                    number in nbr field                     button
                                    and hit enter
                                          |                                       |
                                    3.1.2 Hit next to add                   3.2.2 Enter search
                                    selection to shopping                   criteria and hit
                                    cart                                    "search"
                                                                                  |
                                                                            3.2.3 Click "Select
                                                                            class" on desired
                                                                            course
                                                                                  |
                                                                            3.2.4 Hit next to add
                                                                            selection to shopping
                                                                            cart
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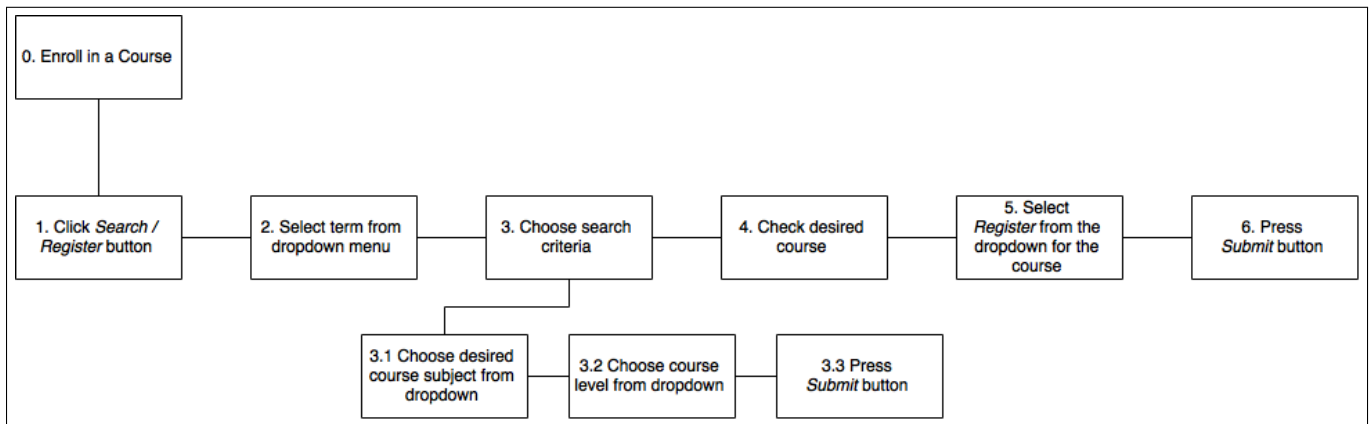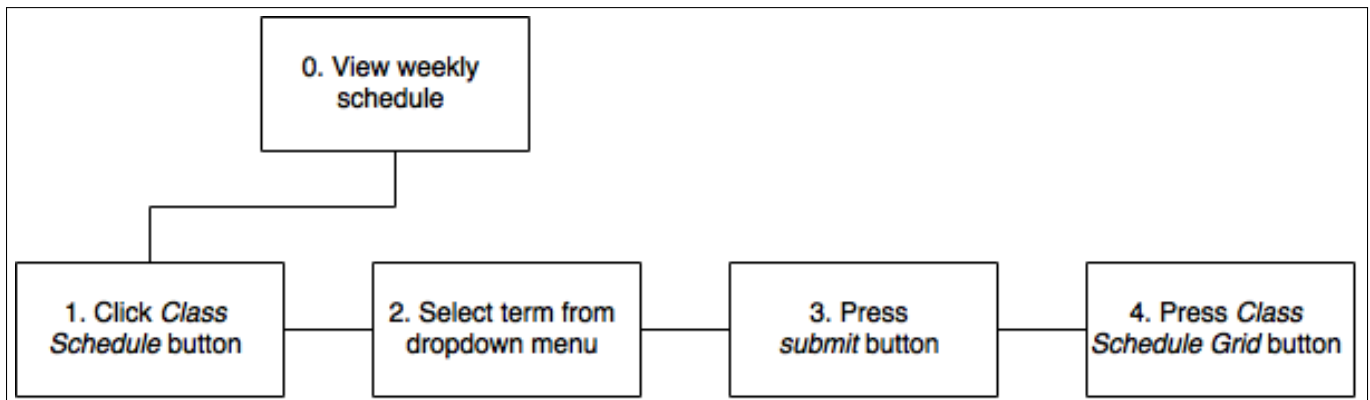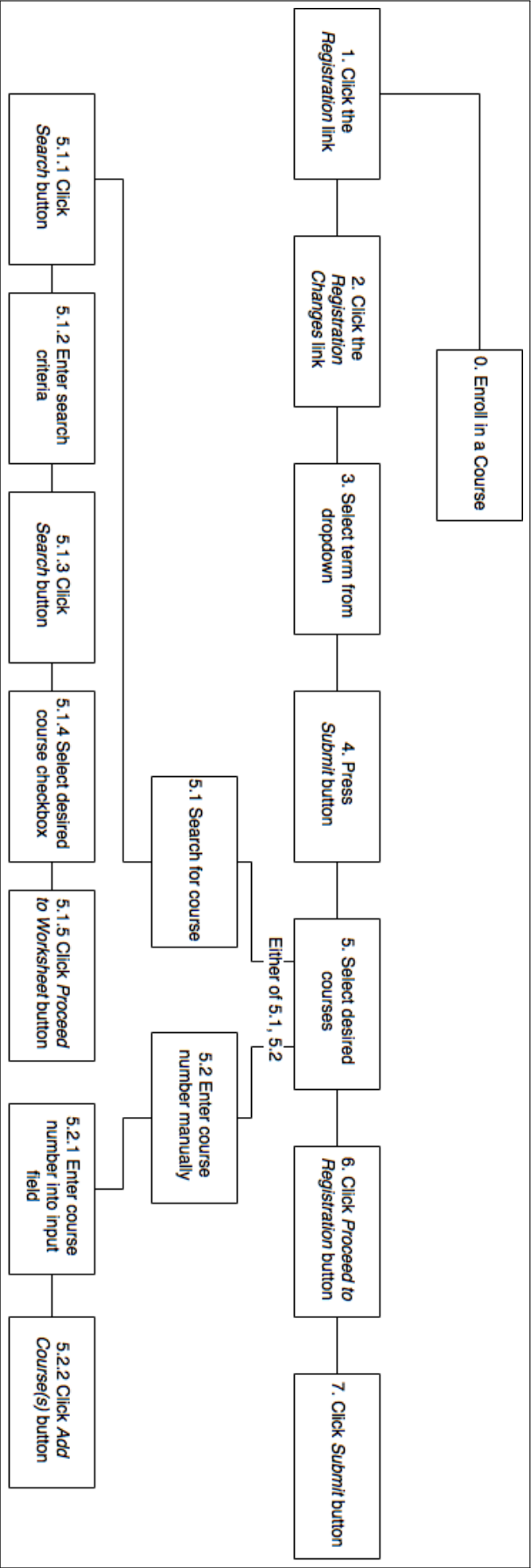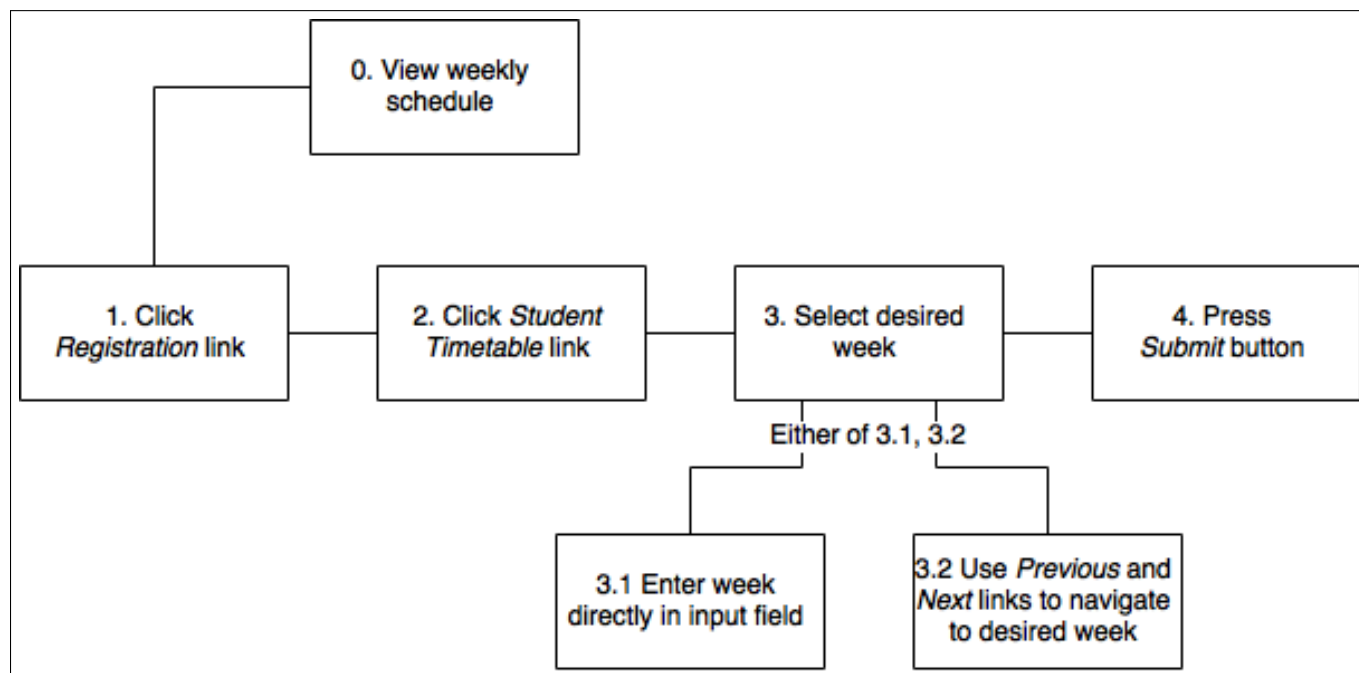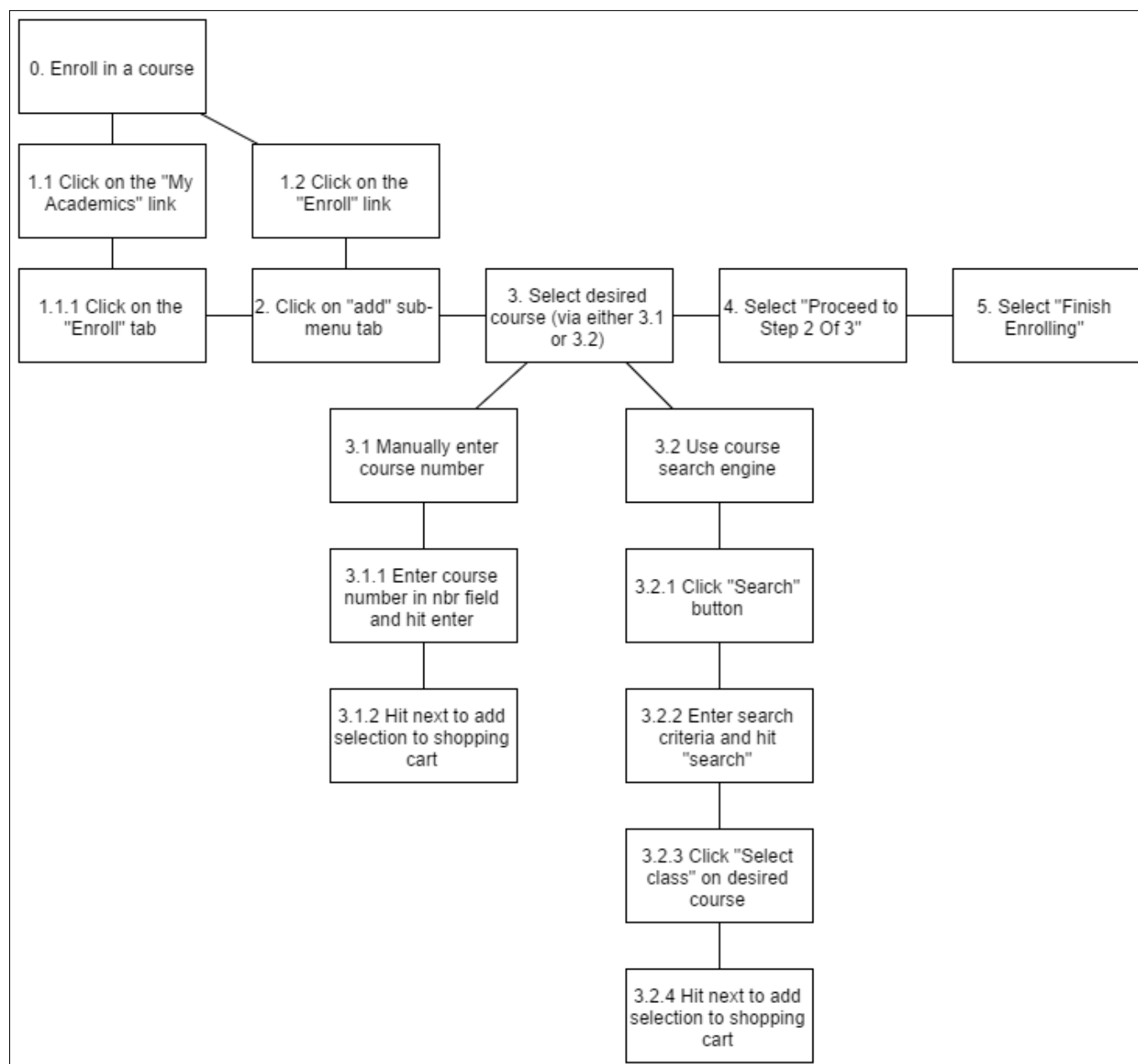
HTA - QUEST, VIEWING WEEKLY SCHEDULE