

# Online Customization and Enrollment Application Network (OCEAN)

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**Abstract**— This paper introduces the Online Customization and Enrollment Application Network (OCEAN), developed in the School of Engineering at the University of Bridgeport. OCEAN is an interactive web-based application for graduate programs, concentrations, certificates and courses across the Schools of Engineering, Business and Education that allows prospective and current students to customize their preferences in the course selection process depending on the targeted graduate concentrations, degrees, and/or dual degree programs.

**Index Terms**— Customized Curriculum, Engineering Education, Web Application.

## I. INTRODUCTION

As a well known fact, course scheduling and selection processes are often very time consuming and overwhelming tasks for advisers and students. In addition, significant increases in enrollment coupled with a growing number of courses and degrees offered in educational programs have recently transformed these procedures to be more complicated and cumbersome, from an advising point of view.

The problem gets even more complex when the curriculum is designed in a way that makes it possible to offer a variety of options for program enrollment, such as certificates, degrees, and dual degree programs.

This elevated number of options, coupled with a flexible curriculum structure that enables the customization of interdisciplinary programs for each student, causes serious set backs in the advising process due to the limits on the number and available time of the advising faculty members. However, in order to create a successful interdisciplinary curriculum and to provide a high-quality, flexible and blended learning environment for the students, institutions of higher education need to increase the variety of their course offerings and options, while eliminating these aforementioned problems.

## II. LITERATURE REVIEW

As a well known fact, course scheduling and selection processes are often very time consuming and overwhelming tasks for advisers and students. In addition, significant increases in enrollment coupled with a growing number of courses and degrees offered in educational programs have recently transformed these procedures to

be more complicated and cumbersome, from an advising point of view.

The literature embodies very few publications that state and/or offer solutions to the growing advising, and course scheduling problem. One of these few studies includes the work by Mihali et al. [1].

In their study, the authors presented a web-based software application to save time for the advising faculty. In their proposed model, the authors employed algorithms that offer optimal course scheduling outputs (from a student perspective) for any given set of courses and requirements, as well as allowing for customizations by advisors or students.

In addition, Davis et al. [2] proposed a curriculum for undergraduate degree programs in Information Systems. The proposed curriculum lists course descriptions and resource recommendations for the IS degree program. The details in the appendices of their work provide the basis for customizing courses while maintaining the coverage defined by the curriculum.

As also stated by the authors, the learning units and detailed IS body of knowledge provides the basis for examining the logic associated with the design and content of each course. They also provide the means for ongoing adaptation and updating of the curriculum.

The efforts to increase the flexibility and quality of the curriculum are surely not limited to course selection. In this regard, Huang and Zery [3] addressed the difficulties in bridging technology with education, in particular; the design and adaptation of technology-enhanced, interactive learning content. They designed a system that houses an instructor authoring tool linked to a repository of high-quality interactive learning content with topics in biomedical sciences. The authors claimed that the resulting customized content could easily be integrated into the existing course web pages of the Faculty.

Motivated by the increasing number of cases where students are willing to take courses at different Universities and its negative effect on the cost and cooperation in designing and integrating curricula, Baldoni et al. [4] proposed a "semantic personalization" web service for curriculum planning. In this study, reasoning about actions and change - in particular classical planning - are exploited for creating personalized curricula; i.e. for selecting and sequencing a set of courses which will allow a student to achieve her learning goal. The specific student's context is taken into account during the process: students with different initial knowledge will be suggested different solutions.

In order to fill this gap in the literature and to provide ease in the decision making process of students and advisors during the course selection process, we propose and implement a system that offers a prototype model of a web-based application.

### III. INTRODUCTION OF THE ONLINE CUSTOMIZATION AND ENROLLMENT APPLICATION NETWORK (OCEAN)

The Online Customization and Enrollment Application Network (OCEAN), developed in the School of Engineering at the University of Bridgeport is an interactive web-based application for graduate programs, concentrations, certificates and courses across the Schools of Engineering, Business and Education that allows prospective and current students to customize their preferences in the course selection process depending on



Figure 1. OCEAN Start up page

the targeted graduate concentrations, degrees, and/or dual degree programs (Fig. 1).

OCEAN is designed for two different set of users: (1) current UB School of Engineering (SOE) students who are currently enrolled in the program (2) Prospective students who are seeking to enroll in SOE courses, certification programs, graduate degrees, and/or dual graduate degrees.

The Courses Menu is for prospective students who are seeking to enroll in one or more SOE courses, where as the Concentrations menu are for those who are willing to obtain a certificate from the school. These two options do not require Full/Part time involvement with the SOE and are offered to any individual who qualifies as a candidate to register for courses and/or enroll in a Certificate Program.

As seen in Fig. 1, OCEAN prompts the user to enter their domain user account name and password. In cases when the user decides to sign in, they could save the reports provided by OCEAN at every step of the application. Otherwise, the web application does not allow the output reports to be saved and stored in the database. New users can sign up by entering their personal information, including their educational preferences and backgrounds if they would like to create a personal account (Fig. 2).

Initially, there are four options offered to the user: (1) Courses, (2) Concentrations, (3) Masters Degree, and (4) Dual Masters Degree. Users can branch through any of these options and view a report listing the remaining courses that are required for their degree completion (Fig. 3).

As can also be seen in Fig. 3, there are two text boxes located at the bottom of the web page that provides a

partial list of available courses and concentrations at the School of Engineering. The content of these textboxes



Figure 2. OCEAN Sign up page

provides links to the course and concentration descriptions, and are altered randomly every time the page is reloaded (i.e., refreshed).



Figure 3. OCEAN Initial page

After the selection of one of the provided options, the user is requested to select one or more of the preferred courses, concentrations, degrees and/or dual degrees. Fig. 4 depicts the list of current courses that are offered in the



Figure 4. OCEAN Course selection page

School of Engineering. Here, the user can make multiple selections by pressing and holding the “Ctrl” key.

After the selection of courses that are of interest to the user, the user is prompted for his/her concentration, graduate degree, and dual graduation degree preferences

respectively. As with most of the recommending systems, this user interface also aims to determine the interest of the current user and use this information for related suggestions. In this regard, the list of user-selected courses narrows down the suggested lists of possible concentrations and degrees, taking these preferences into account. In other words, if the user selects one or more courses, in the consecutive step, OCEAN will take these selections into account and will offer only the concentrations that include one or more of the selected courses in the recommendation list.

The recommendation list is constructed by a search algorithm that provides a hierarchical list of related concentrations. That is, the concentrations including the highest number of selected courses will have the precedence and will appear at the beginning of the list; where as the concentrations with less number of related courses will appear at the bottom. A tie is broken in an alphabetical order.

In each of these consecutive steps of concentration, degree, and dual degree selection, the user may choose not to proceed further, and may skip the step (Fig. 5).



Figure 5. OCEAN Concentration selection page

In the case where the user makes a selection among the candidate concentrations, a short list of degree requirements will appear at the bottom of the page (Fig. 6).

As it can be seen in Fig. 6, the application distinguished the core and elective courses and provides multiple options for various degree completion scenarios depending on the user preferences.

OCEAN, in addition to the its core functionality, also

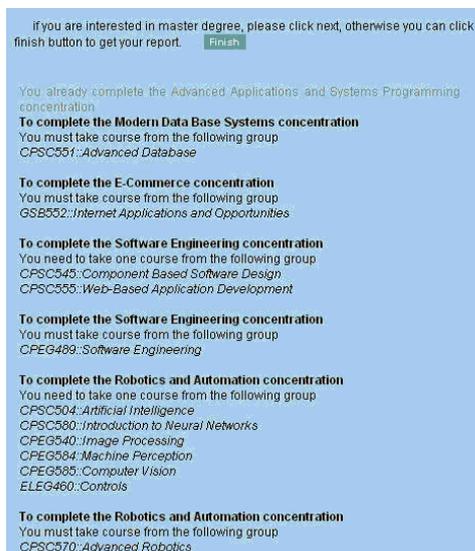


Figure 6. OCEAN Concentration selection page

embodies additional features, including links to the web pages of every department at the School of Engineering; latest news regarding the University of Bridgeport; surveys to obtain feedback from the users and/or students regarding the web application and/or the quality of education at the School of Engineering; and a Help Menu that provides keyword search in the main School of Engineering web site.

In addition to the user interface, there is also an administrative module in OCEAN which enables the administrators of the web application to update and alter the web site. With its classified modules, the administrators are able to login and add/delete courses, concentrations (Fig. 7), degrees and dual degrees from the database. The administrative login also allows the privileged users to access the user information database, to update the News, and to view the survey results.

OCEAN is developed using VB.NET 2005, ASP.NET 2.0, and MSSQLServer2000. This project is developed on a Pentium-4 based machine that runs Windows XP operating system, ASP.NET server, and Internet



Figure 7. OCEAN Concentration selection page

Information Services (IIS). The project is uploaded to the SOE website (<http://www.ocean.bridgeport.edu>).

#### IV. CONCLUSIONS AND FUTURE RESEARCH

This study demonstrated the functionality of a web based application tool, OCEAN, developed in the School of Engineering at the University of Bridgeport. The steps and implementation of the proposed methodology are explained with the help of various examples.

In the future, OCEAN will be enhanced so that it enables students who are currently enrolled in the program to register for their courses online.

#### ACKNOWLEDGMENT

We would like to acknowledge Dimo Sandev who contributed his time to this project.

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Manuscript received 14 June 2007.

Published as submitted by the author(s).