Exploring Courses with Ease: Redesigning the JMU Undergraduate Catalog

Team Big Data

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Problem and Vision

Problem

As the world develops and the workforce becomes more competitive, an increasing number of students are actively pursuing college. Higher education institutions offer many of their services and resources online — including important pieces of information such as course catalogs. For example, James Madison University provides undergraduate and graduate catalogs on its website (https://www.jmu.edu/catalog/). Unfortunately, navigating through the JMU course catalog is not very intuitive because it requires multiple steps to get to the information. How do students find graduation requirements? First, they need to search for the "Degrees Offered" link located in the middle of the right hand-side secondary navigation bar to look for the degree of their interest. Next, they need to scroll through the list of all the degrees offered at JMU and click on the one they need to see its course catalog. Despite doing a good job of laying out the courses into different categories (such as major requirements, degree requirements and sub-requirements), the website does not display the descriptions of the courses until you click on the course link that takes you to yet another page. This approach requires the visitors to jump across multiple pages. In addition to having complex navigation, the JMU catalog does not clearly present additional but crucial information such as prerequisites.

Vision

Our vision for this project is to redesign ways users interact with actual data from the JMU undergraduate course catalog and implement an improved web-based interface. The main goal is to deliver a web-based application that serves as an academic tool for exploring different course options, enabling a more coherent in-depth view of all the information about the courses available to help users make better decisions.

Table 1: Example Catalog Data

CourseID	Name	Description	Credits	Pre-Reg
CS240	Algorithms and Data Structures	Students learn how to implement stacks, queues, lists, sets and maps,using arrays, linked lists, binary trees, heaps, binary search trees, balanced trees and hashing...	3	CS159, CS227 or MATH245, MATH231
CS374	Database Systems	An introduction to database design and management with emphasis on data,definition, data manipulation and query languages found in modern, database management systems.	3	CS240 or CS345
CS159	Advanced Programming	Students use advanced problem-solving strategies to develop algorithms, using classes and objects and techniques such as recursion, exceptions, and file I/O. This course also focuses on designing small applications,and effective testing strategies.	3	CS149

Data and Questions

Data sets

We will be using two sets of data: JMU's course catalog data and enrollment data. The course catalog includes details about major requirements, degree requirements, general education requirements, course descriptions, and credit hours. The enrollment data holds all the information about classes, locations, professors teaching the courses, class sizes, number of sections, and wait-lists. The entire course catalog and enrollment data will be available to us. This data will be provided by JMU's registrar's office. The data given to our team contains all courses and related data to those courses provided in JMU's course catalog. All data provided to our group is property of JMU. The Table 1 above represents an example of the catalog data we will be using.

Questions and Project Goals

The project will attempt to achieve the goals stated previously in the **"Vision"** section by answering the following three questions:

1. *How do we connect course requirements to the classes a student has already taken?* So often when looking for classes to take, a student is bogged down by options that a student can't take because they have not completed the required courses. If we can connect the already completed course of a student to the requirements of JMU courses, then we can significantly reduce the classes a student has to look for. To understand how to accomplish this, we will look at other sources to learn how best connect the data.

2. *What interface design would create the most effective and simple navigation process for students?* One of the greatest issues we have identified with the current interface is its cumbersome structure. We plan to design a new interface that displays all important course information within one web page. In order to achieve this, we plan to use the team's background in web development to design a more streamlined experience.

3. *How can we restructure data to best reflect student needs?* The course catalog data is very broad, making it difficult for the user to query. First, we want to identify user needs and the student experience; then, we can model a new database off of this research. By altering how this data is stored and accessed, we hope to increase the usability of the JMU course catalog.

Users and Specs

Users

The users of our project include prospective JMU students, current students, faculty, staff and advisors. Students will use the course catalog to check their graduation requirements, search for courses that fill those requirements and fit with their schedule, and enroll in courses. Faculty and professors will use the system to input courses they are offering as well as logging in as an advisor to check a students graduation requirements. By making creating a new and improved website, we will be able to satisfy the needs of the JMU students by giving them an effortless experience in browsing the JMU catalog, broadening their understanding of the curriculum, and therefore, simplify their decision-making process. As a result, the university will benefit from these changes as the students make better informed decisions.

Functional Requirements

- For a student account, the website must show which classes are needed for the student to graduate.
- For a student account, the website must display classes that they have completed the pre-requisites for.
- For a student account, the website must only show classes that fit into the students schedule as far as class times.
- For a professor account, the website must provide permit the professors to input courses they are going to teach for the upcoming semester. In the case the professor does not know what time or location of the class being offered, the system must permit the professors to input null for these values.
- For a professor account, if the professor is an advisor, the system must display their advisee's graduation requirements to make sure they are on track to graduate.

About the Team

Susie Nguyen is a second semester junior majoring in both Computer Science and Media Arts and Design, with a concentration in Interactive Design. Her technical background in Computer Science and user research background in Media Arts and Design will enhance the final solution. Her completed programming courses include Data Structures, Computer Systems, and Software Engineering; she has also taken Interactive Design for Web I and II as well as User Interaction Design. She is proficient in Java, C, and Python, and has experience with HTML, CSS, and Javascript. She plans to utilize a holistic view of both back-end development as well as end user experience to come up with an optimal database design.

Josh Norton is a senior Computer Science major. His strengths include Java and C programming, as well as web development with HTML, CSS, and JavaScript. He is currently the team lead for the web development team at Technology and Design for University Unions. In addition, he has experience in web development and .Net programming through an internship at the United Network for Organ Sharing. Josh's broad experience with technical teamwork and programming will help this project come to fruition.

Alicia Pritchett is a senior Computer Science major. She has a strong background in Python, Java, C, and Ruby. Between Bridgewater College and James Madison University, she has completed Scripting Languages, Java Development, Ethical Hacking, and Software Engineering. In terms of front-end programming experience, she has won two competitions at Bridgewater College based on web development. Her skills in both back-end and front-end development will supplement in creating the final database design.

Sam Kettlewell-Sites is a senior majoring in Integrated Science and Technology and minoring in Computer Science, with a concentration in Information Knowledge Management. His concentration in IKM has provided him with a strong understanding of properly handling large swaths of data. His completed courses include Software Engineering, Software Development, Modeling and Simulation, and Machine Learning and Data Science. His experience with Java, Python, Net logo, SQLite, HTML, and CSS provides a varied background in different coding environments.