# SKEDGE

## Smarter course scheduling for our University of Rochester

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**Abstract**

In this paper I present Skedge, a web application for students to comfortably and effectively engage with the University's course catalog. Skedge matches and surpasses the capabilities of the existing University tool for this purpose, "Course Description / Course Schedule" (CDCS) and presents its information in a more visually pleasing way. As a result, Skedge boasts strong user-retention rates, long session durations, and high student adoption despite having virtually no advertisement. Through collected usage data, I demonstrate that a) Skedge's differences from and additions to CDCS are usable and have real need, b) the two major use-cases associated with course browsing—direct search and exploratory search—are effectively accommodated by Skedge, and c) Skedge's search mechanism is user-friendly and self-teaches to users over time.

# Chapter 1

# Introduction

This paper will begin by

## 1.1 Space of course explorers and schedulers

## 1.2 Overview of CDCS

## 1.3 Overview of Skedge

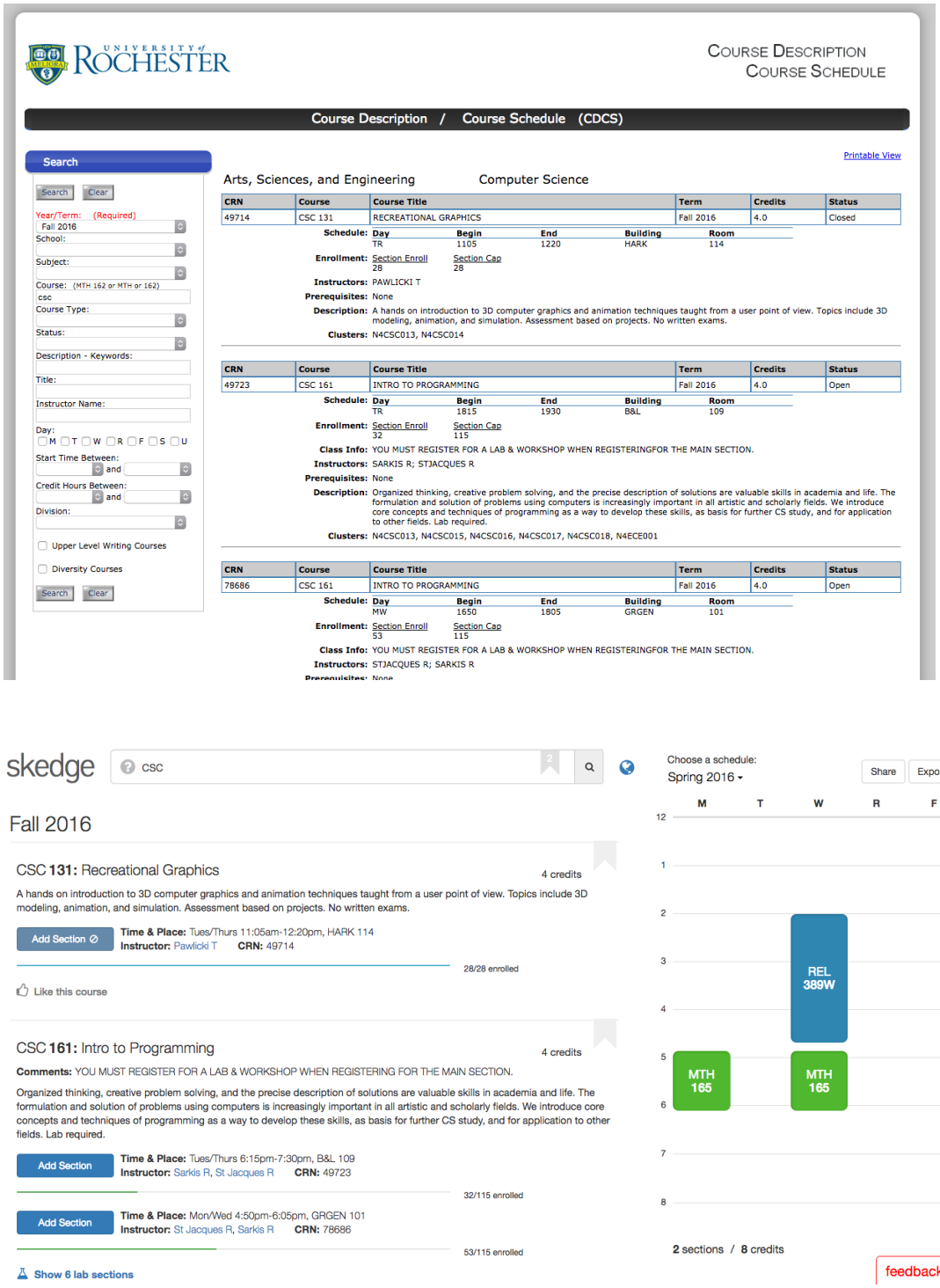


**Figure 1.1:** CDCS (top) and Skedge (bottom) for the search query `csc`.

# Chapter 2

# Design as a reaction to CDCS

Improvements were made by USING CDCS, (bottom-up, not top-down)!

## 2.1 Modernity

CDCS is an old system.

### 2.1.1 GET requests vs. AJAX

- Can use back button - Can send a link to a course or search

### 2.1.2 Built-in scheduler vs. browser extension

- Better UX - Data is centralized

### 2.1.3 Mobile

- Important nowadays - Mobile traffic stat or smth

### 2.1.4 Public API

- Important nowadays, extends student possibility - JSON - Brief demo of API

## 2.2 Usability

### 2.2.1 Data quality

- Courses don't shout - Typos in comments - 12-hour time

### 2.2.2 Section display

- Grouped course sections - Embedded labs (A/B too), workshops, & recitations

### 2.2.3 Course reference

- Clickable/hoverable course links, professor searches

### 2.2.4 Multiple schedule support

- Old CDCS+betterCDCS system can't keep track of this, have conflicts when adding stuff

### 2.2.5 Exporting to GCal, .ics, image

- Mobile sync support - Security: BetterCDCS export gcal is currently broken and sends netID in PLAINTEXT over http(!!!)

### 2.2.6 Search

Most important usability concern is finding courses.

## 2.3 Search

Use cases, natural language.

### 2.3.1 Course selection criteria

Narrowed it down to three criteria. Keep in mind that *none* of the things listed below are supported by CDCS, and they are all supported by Skedge.

#### Requirements

- Finding crosslists - Clusters

#### Browsing

- “New” courses - “Autofit” search - Random - Sorts

#### Friends

- “What are my friends taking?” (“what are you taking this semester” = probably most common smalltalk phrase uttered on campus) - “What do my friends recommend?” - “have you taken this class, and if so, what did you think of it?”

### 2.3.2 Natural language search

See figure.

#### Advantages

- 15 fields reduced to 1

vs form entry: - Faster - More intuitive - More easily extendable

#### Disadvantages

Having to know the DSL, grammar ambiguities (can be solved with a ‘did you mean’)

### 2.3.3 Multipurpose

Used by other links (instructors, course references) around the site

### 2.3.4 Added features

- CRN (!) - Crosslist - Class size

## 2.4 Social

### 2.4.1 The issue

**Static image vs. live site**

- Edits don't update - Referencing courses

**Finding common courses**

- requires your friends to share their schedules on FB publicly and you to see their post - is schedule-first, not search-first - typically only occurs for the current semester

### 2.4.2 Skedge Social

**Friends' course enrollments**

Mini-feed

**Friends' course likes**

**Likes & enrollments embedded in results**

**Personal schedule synchronization**

**Privacy**

**Notifications**

# Chapter 3

# Technical overview

## 3.1 Back-end

## 3.2 Front-end

## 3.3 Analytics

# Chapter 4

# Data analytics

Hypotheses:

1. Skedge's differences from and additions to CDCS are usable and have real need

2. Skedge's navigations-per-add and other metrics demonstrate effectiveness of the use cases a) direct searching, and b) course browsing

3. Skedge's DSL is user-friendly; users learn more advanced search types over time by using it

## 4.1 Usage

### 4.1.1 General

Since November 3rd 2015 (137 days) 3,768 unique users 4,500 schedules Average 90 sessions/day Average 4.92 pages/session Average 5:31 minutes/session 28% of sessions are from new users

MOBILE RESULT

### 4.1.2 Search

#### Empty searches

Can learn from these Some funny ones

### 4.1.3 Course blocks

40% of sessions have at least one block-click Average of 4.94 block-clicks per session

### 4.1.4 Social

90 users have linked Skedge to Facebook Since March 1st, 4,000+ visits (200 visits/day) 60% of visits to /social were returning visitors 90 overlays onto friends' schedules 10 clicks to Facebook profiles :( - get stats from the fb dashboard

### 4.1.5 Conclusion

Success! Considering skedge is OPTIONAL. + course blocks (obv usecase, can't click) + exports (not supported by thing) + mobile

## 4.2 Navigations-per-add

### 4.2.1 Definitions

A navigation is defined as a search, or a click on an instructor's name, or a click on a crosslisted or prerequisite course link

The navigations-per-add, bookmark measure is the number of navigations a user took (within one session) until a course was added, bookmarked

### 4.2.2 Trends

### 4.2.3 Breaking them apart

behavioral patterns Direct search for specific course Discovery, browsing, exploring

**Direct searches**

**Browse**

### 4.2.4 Conclusion

Effective++

## 4.3 Users' search types over time

### 4.3.1 Definitions

Points for search by (omits number and dept.):

description credits crosslisted CRN instructor title year term 'random' upper-level writing

"CSC" 0 "MTH 165" 0 "taught by hema" 1 (2 searches) "random mur 1-2 credits" 2 (1 search)

### 4.3.2 Trends

First increase (60.5Median: 2 searches Average: 4.23 searches (Starting at 1 counts as an increase value of 0)

Second increase (7.9Median: 8 searches Average: 17.52 searches

### 4.3.3 Conclusion

DSL++

# Chapter 5

# Looking forward

## 5.1 Features

## 5.2 Analytics

# Chapter 6

# Conclusions

## 6.1 Proposal to the University

## 6.2 Resources

### Source code

The source code for Skedge is available online under an open source license:

`https://github.com/RocHack/skedge`.

### Live site

The site can be found at: `http://skedgeur.com`.

# Bibliography

[1] Takis Konstantopoulos *Introductory lecture notes on Markov Chains and Random Walks.* Uppsala University,

`http://www2.math.uu.se/~takis/L/McRw/mcrw.pdf`

# Appendix