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Editor Comment:

We are pleased to present our first issue of 2024, including papers on AI in and out of the classroom. We are also delighted to welcome Dr. Kevin Mentzer to the editorial team this year, joining Dr. Dana Schwieger as Associate Editor, along with Drs. Ira Goldstein and Michelle Louch as Cases & Exercises Co-Editors. Thank you to each of these individuals, to our reviewers, and to our Publisher, Dr. Tom Janicki.

Paul Witman, Senior Editor, ISEDJ

Editors

Redesigning CS 100 in the Context
of a Changing University Curriculum

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Abstract

This paper reflects on the process of designing and implementing an update to the *Introduction to Information Technology* course at Bentley University, a business university in New England. Driven by a university-wide curriculum reform initiative and following best practices from digital literacy frameworks and IS model curricula, the new CS 100 course, entitled *Solving Business Problems with Information Technology*, shifted emphasis from a personal computing context to exploring small business applications of technology. Students networked with university alumni at "Topics in Tech" presentations, where they learned about career options as information technology professionals. The authors describe the pilot courses that led to proposing a new CS 100 course and reflect its challenges and successes. Challenges included meeting the university's goal of transfer friendliness, scaling from a few pilots to multiple sections, consistency of course delivery, and evaluating assessment. Successes include placing course topics in a business context, introducing current technologies, and providing opportunities for students to learn about career opportunities and experiences from university alumni. The paper also describes how CS 100 aligns with the university's student learning goals for the new curriculum. These include developing future-focused skills, encouraging curiosity and critical analysis, communicating and collaborating in different settings, and demonstrating understanding of issues related to ethical use of technology.

Redesigning CS 100 in the Context
of a Changing University Curriculum

1. INTRODUCTION

The Introduction to Information Technology course is intended to provide students with the technology skills necessary to succeed throughout their college career and beyond. As a foundational learning experience, the course builds a fundamental understanding of digital technology and the implications of hardware, software, cloud, and networking decisions.

Bentley University, a business-focused institution in New England, was undergoing its first major curriculum overhaul in more than a quarter-century. Major goals of the university's curriculum redesign were shrinking the set of required core courses, adding flexibility, promoting inclusion, and making the curriculum friendly to transfer students.

In addition to mastery of subject topics, student learning goals for the new university wide curriculum include:
- Demonstrating an understanding of the importance of sustainability, ethics, and social and organizational responsibilities
- Applying a set of future-focused skills
- Expanding cultural and diversity competencies
- Communicating and collaborating in different settings
- Exhibiting curiosity and critical analysis.

As enrollments in the IS discipline have declined in recent years(Firth et al., 2008), the new course had to be at a level appropriate for first-year students and designed to entice learners to pursue further studies in computing.

The university invited faculty to develop prototypes of new courses to be introduced to the curriculum. This opportunity served as a catalyst to re-examine IT 101, the university's Introduction to Information Technology course, to evolve to meet the university's goals for the new curriculum.

IT 101 covered 50% Excel topics, 40% computer concepts, and 10% coding with HTML to build simple web pages. Excel content included formulas, functions, charts, table look-ups and pivot tables, and basic macros, so students could gain intermediate level of proficiency. Technology concepts include hardware, software, the Internet, networking, operating systems, and databases. Teaching basic HTML gives students a taste of coding in a simple way. Excel examples and technology concepts were often based on more personal computing scenarios rather than solving business problems. (Leidig & Salmela, 2020, p. 32)

2. LITERATURE REVIEW: COMPETENCY BASED CURRICULUM DESIGN AND DIGITAL LITERACY FRAMEWORKS

Curriculum guidelines for introductory computing/information systems courses at business-focused universities typically include foundational concepts and skills necessary for students pursuing degrees in business and related fields.

Curriculum redesign is placing an emphasis on competency-based learning to promote critical and analytical thinking. "Competency-based requirements shift attention from course structures to required competencies. The main emphasis is on ensuring that the program curriculum engages students in tasks that promote achievement of required skill levels and competencies. The focus shifts from course structures to student learning" (Leidig & Salmela, 2020, p. 32).

In the Information Systems/Information Technology space, several digital competency frameworks have been developed (IEEE, 2021; Naji, 2018; Riel et al., 2012; *Technically Speaking*, 2002) which enumerate skills in information literacy, communication skills, and problem solving as key points necessary to prepare students for success as future IT professionals(IEEE, 2021; Naji, 2018; Riel et al., 2012; *Technically Speaking*, 2002). Noteworthy, the European Union describes 21 digital competencies related to information and data literacy, communication and collaboration, digital content creation, information security, and problem resolution (Carretero-Gomez et al., 2017; Naji, 2018).

The Information Systems Model Curriculum (IS 2010) proposes a Foundations of Information Systems course to provide a basic introduction to information systems for all students, regardless of major. (Janicki & Cummings, 2022). First-year introductory courses often provide an overview of topics related to information systems and the

information technology discipline.

> Information Systems Foundations refer to the ability of students to understand the fundamental concepts of IS (including hardware, software, and information acquisition) and the support that IS provides for transactional, decisional, and collaborative business processes. They will also be able to understand the collection, processing, storage, distribution, and value of information and be able to make recommendations regarding IS that support and enable individuals in their daily lives as well as the management, customers, and suppliers of the enterprise. This competency includes conducting organizational business analysis and assessing processes and systems. (Leidig & Salmela, 2020, p. 51)

In addition to giving students the technology skills they need to succeed in college and as they begin thinking about their careers as future business professionals who need to function in a technology and data-driven world, the course also strives to present current topics and trends within computing/IT. While the new course should seek to educate students on the core ideas and principles as found in any introductory information technology class, as a required foundations course in the revamped university curriculum, the new introductory technology course also should strive to teach students how to harness their "creativity, empathy, judgement, intuition, interpersonal sensitivity, [and] problem solving" skills along with technology so that it "can be leveraged to allow employees to do their work more effectively (Levit, 2018)."

When determining requirements for the university core curriculum, AACU value rubrics for evaluating student performance across many categories provided guidance (American Association of Colleges and Universities, 2013). Especially relevant are applying future-focused skills, explaining the changing roles of technology when conducting business, locating, and evaluating data and using it ethically, assessing the impact of new technologies, and creating skills as self-directed learners to synthesize and transfer learning to new and complex situations.

These outcomes are aligned with competencies identified by the National Association of Colleges and Employers (NACE), which identified critical thinking and leveraging existing digital technologies ethically and efficiently to solve business problems, as two of eight competencies

associated with career readiness. (National Association of Colleges and Employers, 2023).

Requirements and approaches from current models for undergraduate programs in information systems (Impagliazzo & Pears, 2018; Leidig & Salmela, 2020; Waguespack & Babb, 2019) also influenced the course design process.

After considering best practices from digital literacy frameworks and the IS model curricula, the authors set about to evolve the introductory technology course within the context of the university's curriculum reform process. These frameworks influenced the redesign of IT 101 to integrate technology topics and exercises that allow students to develop their digital skills. (Aylesworth et al., 2022)

3. REDESIGNING THE "INTRO TO COMPUTERS" COURSE WITHIN THE UNIVERSITY'S CURRICULUM REFORM

The University's curriculum reform provided the impetus to redesign its "Intro to Computers" course. The real innovation in redesigning the new course is its approach to using business examples rather than personal computing examples. A change in title from *IT 101: Introduction to Information Technology and Computer Systems* to CS *100: Solving Business Problems with Information Technology* captured the focus of the new course and its emphasis on problem solving and critical thinking, also a goal in the university's curriculum reform. Like other courses introduced in the new university curriculum, CS 100 would need to meet the university's curricular goals while enabling students to develop the skills and competencies required and to achieve learning objectives for the course.

Research conducted at the university surveying all incoming students from 2019-2022 about their digital literacy skills confirmed that digital literacy skills of incoming students were decreasing each year (McCarron & Frydenberg, 2023). As a result, an increased emphasis on developing digital skills was critical.

Three instructors proposed and taught experimental "pilot" courses with original assignments, activities, or hands-on labs to evaluate different approaches. See Appendix B for a sample outline from one of the pilot courses.

A committee examined lessons learned from the pilot courses and began to design a new

introductory technology course to become part of the new core curriculum.

Many of the topics from IT 101 carried over into CS 100, primarily guided by the content included in learning resources provided by the publisher. In addition, the university requested that CS 100 include new related topics (teamwork and cloud-based collaboration tools, for example) to expose students to these tools prior to taking future courses.

CS 100 needed to incorporate problems with more of a business focus. To accomplish this, students would build business related websites for their HTML assignments rather than personal ones; they would examine company balance sheets and stock data rather than personal budgets in Excel and would evaluate hardware and cloud services required to operate a small business. Taking a business approach to these topics became a major part of the course redesign. See Appendix A for an example of a sample website assignment. The course allocates two or three sessions on HTML, so the websites that students create include only basic elements such as headings, paragraphs, links, images, embedded maps or videos, and simple CSS to add colors and fonts for visual appeal. Some students created websites for their families' businesses, while others designed sites representative of local businesses such as a diner or landscaping agency.

Appendix C shows a sample syllabus and schedule for CS 100 as well as the sample schedule for its predecessor, IT 101. While the topics in IT 101 and CS 100 are similar, the business approach brought to CS 100 is its major contribution

The pilot courses had many more experimental hands-on lab activities and incorporated Excel problems that were often related to the week's technology concept content.

4. INNOVATIONS

Course innovations include presenting topics in a business context, introducing current technologies, and requiring attendance at a "Topics in Tech" speaker series featuring university alumni. These innovations represent the successes and accomplishments in implementing CS 100 in line with curriculum goals.

Business Context
Students appreciated learning the material from a business perspective. They often could relate concepts from other introductory business courses that they were taking with what they were learning about in CS 100. Although some instructors were slow to adopt this approach during the inaugural offerings, as the course matures, and as more new full-time instructors are scheduled to teach CS 100 in coming semesters, issues of consistency in course delivery and buy-in to the business-oriented approach should resolve themselves.

Current Technologies
The course aimed to introduce, at an introductory level, several current developments in technology with which students should have some familiarity: artificial intelligence, machine learning, augmented and virtual reality, Internet of Things, data visualization, financial software services, cryptocurrency/blockchain, and cybersecurity.

Many instructors chose one or more of these topics to introduce to their classes at a very basic level, bringing publisher-provided materials, YouTube videos, or their own real-world experiences to the class discussion. This section presents ideas for instructors to implement experiential learning activities introducing these current technology concepts in their classrooms. Some instructors have implemented these and other hands-on activities in their classrooms, but they are not required or consistently offered in all sections.

Artificial Intelligence/Machine Learning. CS 100 launched officially in Fall 2023, just half-a year after the meteoric rise in popularity of widely available generative AI tools. Some instructors incorporated the use of generative AI tools in their classes, from showing how to generate images to creating effective prompts to assist in creating Excel formulas.

To convey the basic concepts of Machine Learning, the Quick, Draw! web app from Google provides the basis of a simple lesson. Participants draw the image (a dog, a banjo, a surfboard) presented to them on their computer or mobile device, and the application tries to identify their drawing. The application stores each drawing as training data for the guessing module. Learners can see all of the collected drawings from all users around the world for each image and describe, at an elementary level, how their drawings help train the model that Quick Draw! uses to recognize the different images.

Augmented and Virtual Reality. Students can experience augmented reality using their smartphones with Google Maps walking directions, which overlay direction arrows and

landmarks on top of the live view of the user's location, or by visiting retail websites which allow users to see how an item might appear in their home, by superimposing a photo of a lamp, for example, in their living room. If virtual reality headsets are available, students can use those, or they can create VR scenes using available tools (Andone & Frydenberg, 2019; Doty & Gunderson, 2019).

Internet of Things. Hands-on lab activities using Raspberry Pi and Amazon Echo devices introduced students to Internet of Things concepts and technologies (Frydenberg, 2017, 2023).

Data Visualization. Open data websites with US government data (data.gov) and Analyze Boston (data.boston.gov) provide access to datasets and built-in tools to filter, sort, and analyze data, and visualize data with charts and maps. Specialized visualization tools such as Datawrapper (datawrapper.de) offer free or trial versions that allow users to create charts, maps, and tables to visualize data with no coding and little setup. Advanced learners can try to recreate some of these visualizations themselves using a spreadsheet app such as Excel or Google Sheets.

Financial Services Software. Introducing Bloomberg Terminal in an introductory information technology course exposes students to financial services software used in business and reinforces many concepts, such as client/server applications, interacting with a command line, and application programming interfaces (Frydenberg et al., 2021).

Cryptocurrency/Blockchain. Watch videos on blockchain; show students a cryptocurrency wallet if anyone has purchased Bitcoin or other cryptocurrencies; visit Paypal, Venmo, or other payment apps to see how they support payment in cryptocurrencies; view OpenSea (opensea.io) or other NFT (non-fungible token) online marketplaces to learn that they can be purchased with cryptocurrencies.

Cybersecurity. Show students how to check their own email addresses or passwords to see if they have been breached using Have I Been Pwned (haveIbeenpwned.com) or demonstrate open source intelligence tools that students can apply their knowledge to solve cybersecurity puzzles (Frydenberg & Lorenz, 2020),.

Topics in Tech
Students in all sections participated in the "Topics in Tech" program, a series of guest speakers, organized by the university's technology learning center. Most speakers are CIS alumni and industry leaders who talk about their careers as information technology professionals. (See http://cissandbox.com for information about prior speakers and recordings of their presentations.) Speakers often share experiences about life after graduation, college courses they found incredibly valuable as they started their careers, and examples of projects they are working on now. Ten to twelve speakers are invited each semester; students sign up for the topics that interest them; many are in person; some are online only when the speaker is geographically distant or cannot attend in person, and some are offered both in person and online simultaneously.

Topics in Tech introduces current students to university alumni, teaches them the importance of professionally networking (most attendees end up following their speaker on LinkedIn), and shows the wide range of career possibilities available to CIS majors and minors. Current students meet alumni working at both big name and local tech companies, and by hearing their experiences, can begin to see the possibilities that may be available for themselves upon their graduation.

Participation in Topics in Tech also encourages students to develop skills in educational awareness, identity awareness, resilience, critical thinking, leadership, and dialogue. After attending, students write a short report reflecting on these aspects of what they learned from the session they attended:

- Who is the speaker? What do/did they do?
- Could you see yourself doing the kind of work that they will do in the future? Why or why not?
- How did this presentation help you think about analyzing information before making decisions?
- In what way could you identify with the speaker's experiences or challenges?
- What one thing from the speaker's presentation that you remember the most, or that made impact on you?

Rather than ask for a summary of "what did you learn", these focused questions require the students to reflect on the experience in a way that is more personal and goes beyond stating facts. In many sections, instructors invite students who attended a Topics in Tech talk during the previous week to share what they learned with their

classmates. Many students share thoughtful comments that generate engaging class discussions.

5. IMPLEMENTATION CHALLENGES

Building a new course from an existing one for an entirely new curriculum is no easy task. Challenges included meeting the university's curricular goal of transfer friendliness, scaling from a few pilot sections to multiple sections, consistency of course delivery, and assessment. As the course evolves, additional work will be necessary to ameliorate these challenges.

Transfer Friendliness
One goal of the university's curriculum reform was to enable students who take similar courses at other institutions to receive transfer credit for them. Creating a transfer-friendly environment for students is critically important to the university as an increasing number of college students complete one or two years at a community college before transferring to a specialty institution to complete their degrees. (Mangan, 2020). While transferability is an important goal to strive for, achieving it is exceptionally difficult for CS 100. Bentley University is unusual in requiring an IT course which combines both intermediate proficiency in Excel with strong digital literacy skills in the core curriculum. The combination of topics in CS 100 are not often found in one course at many other institutions, making it difficult to find equivalent courses offered at other institutions. Giving transfer credit to students whose prior courses omit one or more major components of CS 100 puts those students at a real disadvantage in their future business courses for which CS 100 is a prerequisite. As a result, very few transfer students received transfer credit.

To receive transfer credit for CS 100, students may need to show that they have taken multiple computer courses at other institutions that cover these topics. One recommendation to improve transfer friendliness may be to clarify the topic knowledge and competencies that incoming transfer students need to have to receive transfer credit.

Scalability
Creating a course that was scalable to multiple sections taught by several instructors was an administrative (not pedagogical) goal of this redesign. While the pilot courses relied on instructors building original Excel problems and locating articles, or websites from the Internet rather than standardized publisher-provided books and support materials may work fine for a small number of sections, this does not scale to more than 20 sections taught by several, mostly part-time, instructors.

Grading and preparation had to be manageable. Some instructors teach three or four sections each semester, which can be very grading intensive. The choice of publisher-provided learning materials impacts scalability. Selecting publisher-provided materials that cover the desired content and offer automatic grading of homework and exams, several versions of practice problems and quizzes, test banks, the ability to create multiple equivalent versions of the same exam to minimize academic integrity concerns, and a rich collection of instructor resources is crucial. This requirement can significantly narrow the choices for course materials.

The pilot program tried offerings from a different publisher and exposed these weaknesses. When launched, the new course used the same publisher-provided materials as the old course. This promoted the misperception that the former IT 101 and the new CS 100 were the same course because they used the same publisher learning materials, despite the new business focus and innovations brought to CS 100.

The course relies on CIS undergraduate tutors to provide consistent training for students to set up their laptops and mobile devices with the electronic resources and software necessary for the course. CS 100 students sign up for one of several 80-minute Jumpstart sessions offered outside of class time, during the first week of the semester. They gather in a learning lab where tutors guide them through the steps of configuring their email, cloud storage, malware detection, alternative browsers, e-books, and other resources. Students using Apple computers running MacOS have additional steps to configure a virtual applications server so that they can access Windows versions of Excel and other productivity applications whose Mac versions are not compatible with publisher-provided exercises or self-grading tools. This approach removes the burden from instructors on supporting computing configuration issues during class time. From a scalability perspective, providing this training to the nearly 700 students enrolled in CS 100 each semester requires offering 5 Jumpstart sessions with 25 students each, facilitated by two tutors, each day for seven days. This significant investment in tutoring resources allows offering this training at scale and helps ensure that students' devices will be set up correctly and

minimize configuration issues later in the course.

Consistency of Course Delivery

Providing ample instructor training is critical to increase the likelihood of consistency in course delivery across sections. Training needs to focus on pedagogical choices and approaches to teaching the course in addition to reviewing the mechanics of configuring the publisher's provided learning materials and course management tools. Even with publisher-provided learning resources, common assignments and exams, some seasoned instructors found it difficult to adapt their teaching style to emphasize the new business-focus of CS 100. Most had not been involved in the pilot course development, so offering a greater background on the new approach would have been beneficial. Additional training would be required to ensure instructors are able to incorporate some of the hands-on technology labs introducing current technologies, as described in Section 4.

CS 100 had an increased emphasis on teamwork, primarily because using web-based collaboration tools was integrated into a lab activity that all sections completed. Several instructors reported that in-class examples were much more likely to be business oriented but overall, the experience in many CS 100 sections was a minor upgrade from IT 101, but not entirely the new course that was envisioned originally. Asking adjunct faculty to change or adapt their teaching styles and materials to support a new course can be difficult, but when supplied with the correct tools and support, they can change.

Assessment

The course relied on publisher-provided multiple-choice questions for standardized midterms and finals, as well as Excel skill tests completed in a virtual online environment to assess student learning. Exams are given within the publisher's online learning environment. Although exams are timed, because the publisher's online learning environment did not support the use of a lockdown browser, students were able to access AI tools and search engines, and therefore tests may not accurately measure what students are learning.

Surveying students before and after the course would have provided another metric to assess students' learning and experiences in the course.

6. DISCUSSION AND CONCLUSION

Updating an introductory computing concepts course to meet changing business needs and the requirements of the new curriculum was a long process. Students are coming in with fewer technology skills than in previous years, so the need for an introductory computing course remains strong. The university curriculum reform process evolved, requiring agile decision making to meet goals.

Information systems professionals rely on Excel, so emphasizing business-problem solving with Excel is an appropriate choice for meeting both department and university curriculum objectives related to critical thinking.

It is too early to assess the impact of the course on a student's future college experiences. The course would benefit from creating an earlier exercise focusing on teamwork that will introduce students to the tools, issues, and processes involved when working in teams before they need to complete a larger group assignment. Similarly, creating standard content for the current technologies identified earlier will facilitate instructors in including this material in their sections.

Teaching methods also need to evolve, as interactive, hands-on learning has resulted in increased student satisfaction. In many cases, this shift requires retraining longtime instructors to approach their courses in new ways. This is the direction that to must move with this course and the more instructors who effectively teach this way, the better today's students will learn. Incorporating a more project-based approach with automatically graded activities or assignments that are easy for instructors to grade manually will give students a richer experience and enhance their learning. Such a project-based learning approach would be a better way to ensure that students are learning and able to apply the course concepts, rather than memorizing terms often found as the subject of multiple-choice questions.

An innovative strategy may be to evolve CS 100 into an elective project-based approach where students choose labs to complete based on their own interests. Activities could include hands-on experiences with internet of things, data visualization, artificial intelligence, virtual reality, and other current topics. These activities, which faculty would need to develop and department tutors would need to support, would enable students to explore their own IT interests without requiring each instructor to become an expert on each activity. A few selected sections piloted this strategy during the first three semesters that the new course was offered and found it to be very

successful. Additional work needs to be done to determine the extent to which this approach can scale to more sections.

Discussions related to redistributing digital media and the use of AI tools are natural for understanding the ethical issues when using technology. By participating in Topics in Tech events students learn not only about the cultures of business, but also the diversity of the workforce as they network with alumni who share their professional experiences.

The course redesign met several of the university's student learning objectives for the new curriculum, as learning new technologies and developing Excel skills encourages curiosity and critical analysis while applying a set of future focused skills. The increased focus on teamwork provides opportunities to communicate and collaborate in different settings and introduces the importance of one's responsibilities within an organization.

The redesign of CS 100 proved to be an exercise in creating a new course that presents information technology concepts from a business perspective, focuses on problem solving, and prepares students for future success.

6. ACKNOWLEDGMENTS

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APPENDIX A

Business-Focused Web Assignment

CS 100 Fall 2022 Web Assignment Create a Company Profile

Instructor Notes: This assignment assumes students did previous research about a company in which they downloaded stock prices or other financial data to Excel and made charts of the data.

In this assignment you will work in a group of three to create a website sharing the results of your prior research about a publicly traded company. Each student will create one topic page as described below, and an "About" page. The group will create a group page that links to each member's topic page.

The Website
Your group's website will contain these pages:
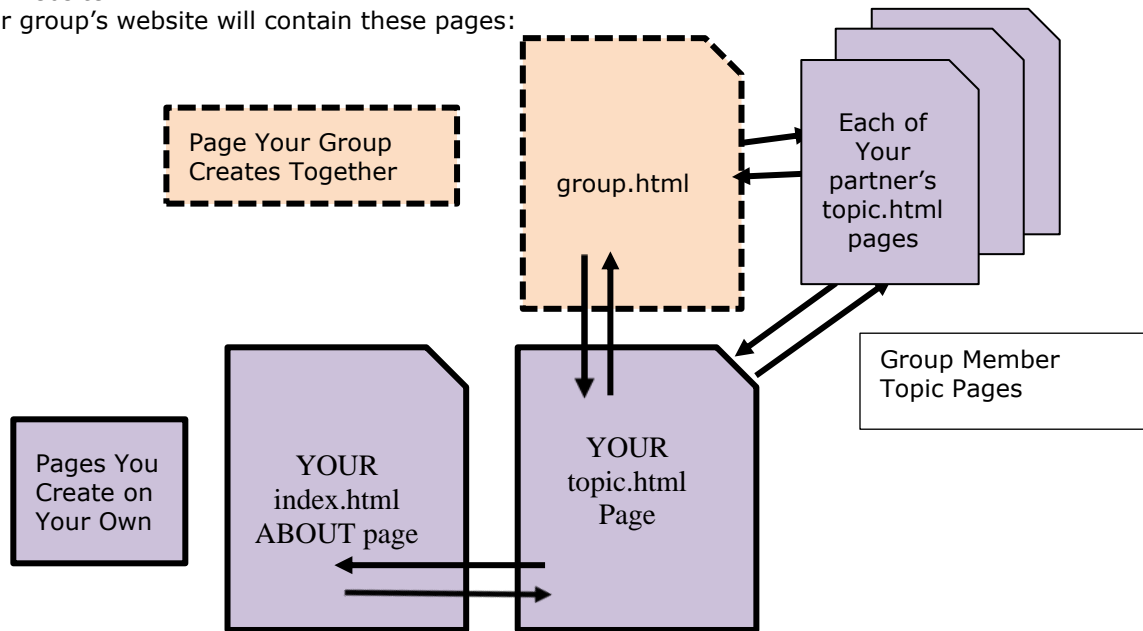
Group Page: Company Information (Each person in the group should work on at least two or three of these features, ok to work together)

- Page must be named group.html
- A banner image (created using canva.com or some other app) placed at the top of the page
- Three facts about the company
- Links to the company's page(s) on social media (Facebook, Twitter (X), LinkedIn, Instagram)
- An embedded video from YouTube with information about the company
- An embedded Google Map showing the company's primary headquarters
- Format the sections of your group page using various heading tags (<h1>, <h2>) and styles
- Use an unordered list to include the names of the members of your group
- Navigation Links to each of the three topics pages using images from cooltext.com as links
- Upload the page to your web.Bentley.edu account and give the link to your group members

Topic Page 1: Financial Report

- Page must be named topic.html
- A banner image (created using canva.com or some other app) placed at the top of the page
- Screenshots of the company's income statement from an online finance site
- Two paragraphs (at least two sentences each) describing key take-aways from the income

statement (profit, sales trends, debt, cash on hand, assets, etc.)
- A link to the company's home page
- Navigation Links to your index page, the other topics pages, and the group page

Topic Page 2: Company News

- Page must be named topic.html
- A banner image (created using canva.com or some other app) placed at the top of the page
- Link to any online news story about the company
- Two paragraphs (at least two sentences each) summarizing recent company news
- An image containing the company logo that you find online
- Navigation Links to your index page, the other topics pages, and the group page

Topic Page 3: Recent Stock Prices

- Page must be named topic.html
- A banner image (created using canva.com or some other app) placed at the top of the page
- A link to your Excel workbook on Microsoft One Drive (anyone with the link should be able to view) showing stock prices for the past 3 years
- Screenshot of an Excel chart you made showing stock prices
- Two paragraphs (at least two sentences each) describing information you can learn from the stock prices chart
- Navigation Links to your index page, the other topics pages, and the group page

Your About Page

- Page must be named index.html
- Your Name
- List of contributions you made to the group page (as a bulleted list)
- A link to YOUR topic.html page

HTML and Style Requirements

On your topics or index page, use each of these tags, styles, or features appropriately at least once:
- All images placed in an images/ folder
- Different page backgrounds (colors, images, or gradients)
- <h1> and <h2> tags styled in any font other than Times New Roman, and not black
- <p> styled with a sans-serif font in a color other than black
- <span> tag to highlight a section of text in a different color, weight (bold), style, or font
- <img> tag with alt attribute
- Unordered <ul> or ordered <ol> list
- <a> tag to a page within your website that displays in the same browser tab
- <a> tag to an external page that displays in a new browser tab

Notes

- Each student uploads their index.html page and their topic.html page to the class web server
- One person uploads the group's group.html page to their account on the class web server and

provides the link to the entire group so each topic page can link to it.
- Navigation links to other pages from your topics or index page can be either text or graphics
- Navigation links from the group page to other page should be clickable images as links.

To center a banner image across the page, add the <div> tag code shown here around your image tag.
<div style="text-align:center;"><img src= "images/banner.png">**</div>**

What's Due and When
Part 1. Due Tues Nov 8
Create your own index page and topic page with only your name and the name of the pages. For example, your index.html page would have your name on it followed by the word *About*, and your topic.html page would have your name and a descriptive title. Be sure to customize the <title> tags. You will change the content of these pages when you work on Part 2.

HTML Features for Part 1:
- Format the backgrounds of these pages so that one uses a solid color other than white and the other uses a background image, gradient, or color of your choice.
- Set the <title> of each page to include your name followed by the word About for your index page, or Topic for your topic page.
- Add the links between your two pages.

Upload the index.html, topic.html to the class web server and visit the page in a browser to see that it works. Click on the links to verify they are correct. If you can't see the page, neither can I.

Part 2. Due Tues Nov 15
Add the content and links to your index page and topics pages as described above.
Work with your group to create the group page and add the content and links.

Please use the VS Code IDE to create a website and post it to your account at web.Bentley.edu.
Your website HTML code should follow current HTML5 standards. Do not use outdated (deprecated) tags.
Create a website folder on your computer where you will keep the files for your website

Fancy Stuff Using Images as Navigation Links
Go to http://cooltext.com and create graphics for each person's topics page, and the group' home page. Use these graphics as navigation links on the group page, and on each person's topics page. Place all images as navigation links just below the banner and just above the content of each page, on a new line, aligned center. You may share these files with your group members so they can use them on their sites as well.

To use an image as a navigation link, place the code for the image around the ** ** to make the image clickable. If you add border = 0 attribute, then the image will have no border.

```
<a href="topics.html">
    <img src="images/cyber.png" alt="cyber" border= "0">
</a>
```

Publish Your Website
Publish your pages to the class web server using Filezilla. You do not need to submit any files for this assignment. Please upload your website files to your account and check to make sure your website displays correctly! The best way to do this is to open a browser in private browsing mode (Shift + Control + N in Chrome) and view the website there. If you can't see it, neither can I, and I can't give you credit for a website I can't see!

Rubric

Part 1

Index page with link to Topics page	**3**
Topics page with link to Index page	**3**
Page Titles with customized <title> tags	**2**
Site loads in a browser (pages uploaded correctly)	**2**
Total:	**10**

Part 2

HTML Tags and Style Requirements	**18**
Original Banner Image on Your Topic Page	**2**
Navigation Links on Topic and Index Page to Group and other Topics Pages	**4**
Topic Page Image or Screenshots	**2**
Topic Page Link to specified content	**2**
Topic Page Text Description	**4**
Topic Page Content	**3**
Index Page Content	**3**
Your Contribution to the Group Page	**12**
Total:	**50**

APPENDIX B - CS 100 Experimental Pilot Course Outline

Topic	Software Skills/Active Learning	Sessions
Introduction to the course Starting a Business: Product vs. Service? Research competitors Differentiate – what can you bring to the table?	University Computing Services, LMS Setting up Online Textbooks Search engines: Research competitors, Create specialized search queries	2
Choose computer hardware PC vs. Mac vs. Chromebook Printers, Storage Devices Rent or buy? Cloud or on premises?	Getting Started with Excel	2
Operating your personal computing devices Folders, paths, etc. Zipping/unzipping Backup/restore Troubleshooting Security: Safe computing	Formatting workbook text and data Scan / back up your computer	2
Choose computer software Licenses vs. Cloud vs. 360 Docs, spreadsheets, presentations, database Set up a wireless network	Perform calculations with formulas & functions in Excel Compare Office Suites (Google, Office 365) on desktop and mobile platforms Synch data across devices and platforms	4
Data breach! (Ethics case) Keep machines clean Virus/malware issues Ransomware Phishing	Scan your system using antivirus, Malwarebytes, and similar software	1
Brand the company Name, logo, tagline Colors, fonts Mission/vision	Design a logo and graphics with graphics software Register a domain name	1
Create a Website Select a domain name Content Management System or Hand-coded? Buy hosting	Content Management Tools (Wix, Weebly, Google Sites, etc.) HTML, CSS, multimedia	3
Advertise the company Social media Google Analytics Direct? What makes sense for type of company	Twitter, Facebook, Instagram; Spreadsheets: Analyze or chart website usage data	1
Hire people What jobs do we need? How much can we afford? Advertise – where? Compare resumes	LinkedIn, monster.com	1
Start selling Add/delete people or products? Add new stores/features?	Analyzing and charting financial data	1
Get Capital Small business loan? Find investors? Go fund me, etc.?	Analyzing and charting financial data	1

Review session and Midterm	2	
Organize and Analyze Data Check daily, weekly, monthly sales Top employees/top customers	Pivot Table module Databases	4
Cloud Computing Services	Generating Reports	1
Staying Ahead of the Competition New and emerging technologies: - virtual and augmented reality - mobile apps - smart technologies (IoT) - machine learning/AI - Blockchain	Working with Multiple Data Sources	2
Final Projects		

APPENDIX C – CS 100 Course Syllabus and Schedule

CS 100 Solving Business Problems with Information Technology

Instructor		Office Hours	Please contact me to make an appointment via email, in class, or on Microsoft Teams.
Office			
Phone			Tuesday 3:30 pm or by appointment.
Email			

Texts

New Perspectives on Computer Concepts 2022: Comprehensive, by June Jamrich Parsons, 21st Edition, Copyright 2023

New Perspectives Collection, Microsoft® 365® & Excel® 2021 Comprehensive, by Patrick Carey,1st Edition | Copyright 2023

What is CS 100?

You will learn about the process of starting and running a small business from an information technology perspective. By the end of the course, you will be able to identify and use information technology resources for problem solving of all types and in all class work, with a specific focus on understanding how information technology enables modern businesses to operate. You will also be able to demonstrate your proficiency with information technology tools and concepts by accomplishing these tasks:

- Excel:
    - Write formulas, use built-in functions, and format data
    - Present data visually using charts and graphs
    - Analyze data with pivot tables and lookup functions
    - Record macros to improve productivity
    - Protect worksheets, validate data
- Web Development:
    - Recognize appropriate uses of HTML, JavaScript, and CSS
    - Code a website containing formatted text, links, and media
    - Interact with a browser and web server, and describe the role of each when viewing and publishing
    - Describe the process of selecting and registering a domain name
- Information Technology in a business setting:
    - Learn to work on technology projects as a member of a team
    - Describe strategies for selecting hardware, software, cloud, and networking
    - Use social media, search engines, and the web effectively
    - Use software to create, modify, and present business documents and multimedia
    - Use the web, web databases, and search engines as a research tool
    - Identify software and strategies to keep computers, mobile devices and data safe and protect individual privacy
    - Explain the role information technology plays in today's society by discussing the various legal, societal, ethical, and economic dilemmas and trends driven by information technology
    - Explore emerging technology trends such as artificial intelligence, machine learning, virtual/augmented reality and the Internet of Things and their impact on conducting business

What Happens in Class?
Our class meetings will combine a variety of learning formats, including hands-on activities, presentations by both students and the instructor, demonstrations, class discussions, readings and videos. By completing both individual and group homework assignments and projects, you will demonstrate that you have learned the course concepts. All assignment requirements and associated handouts will be available from the class Blackboard site.

Preparing for Class and Homework
Although you will only spend approximately three hours each week in class, please plan to spend four to six hours per week outside of the classroom working on readings or assignments for this class. This class will probably require more of your time than any other class you are taking (but it's also likely to be the most fun and offer the largest personal rewards).

Outside of class you will:

- Read the concept book content, complete quizzes, and prepare for class discussions
- Work on Excel problems and complete any activities that you do not finish during class.
- Attend at least one Topics in Tech event to learn about careers and/or current trends in technology.
- Check your email and the course Blackboard site every day. I try to respond to messages within 24 hours and expect that you will do the same whenever possible.

Getting Help

- Please feel free to contact me on Microsoft Teams for quick questions or to make an appointment to meet to go over topics or assignments, or just to say hi. I'm often online late in the evening, and when I can, I'll post a Zoom link so you can join me. Feel free to email me during the day and if I can I'll meet you in the evening.
- When sending me email, PLEASE include your section and a brief description in the subject line (i.e. "CS100-18 Assignment 1"). Your emails are important, and I don't want to miss them!
- Tutors are available to help you online or in person. Please visit the lab for drop-in hours. Almost all of them have all taken this course so there's usually someone available to help you.
- Please do not ask the tutors how to do your homework (or to do it for you). It's ok to show them what you've done and explain what you think needs work.

Assignments and Grading
Each assignment is worth a percentage of your final grade. Together, all the assignments add up to 100%. Please note that the total number of points shown on Blackboard is not your final grade in the class. 100 points on an exam are weighted more than 100 points on one of your Excel assignments.

Concepts Modules	10%
Excel Tutorials (8)	8%
Excel Projects (8)	17%
Website	10%
Topics in Tech	2%
Attendance, Attitude, Attention	3%
Router Lab	5%
Other Hands-on Labs	5%
Research Project	5%
Midterm	15%
Final Exam	20%

- Exams primarily will cover Excel topics.

- Excel Labs are business problems designed to develop your proficiency and skills using Excel. They are completed in Excel and graded automatically.
- Hands-On activities give you the opportunity to build technology solutions.
- In the Group Project you will work with a team of four students to research and present the use of an emerging technology in a business context. You will collaborate as members of an international team with students at another university. For this project's deliverable, your group will create some form of collaborative digital media to convey what you learned. You will present it in class.

Due Dates, Extensions, and Make-Ups

Please hand in every assignment on time. Due dates will be posted on Blackboard. I may take off points if an assignment is handed in late, and generally will not accept an assignment submitted more than seven days after its due date. To encourage you to complete your work on time, I may apply a penalty of 20% on any assignment submitted up to seven days after the announced due date.

That said, if you need extra time on an occasional assignment because you have a busier-than-usual week, or because of other unforeseen circumstances, please ask beforehand and if possible, I will try to accommodate your request.

Adjusting to a new routine in college is not always easy. If circumstances at home or on campus are affecting your ability to do course work or you are feeling overwhelmed, please contact me so I can work with you, direct you to appropriate campus resources, and accommodate as necessary. You do not need to disclose any more information than you are comfortable.

Make-up exams will not be allowed except for the most extreme circumstances and only with prior arrangement. It is your responsibility to schedule a makeup exam with me. Please keep track of your class standing throughout the term. It's important that you discuss any significant issues with me before the end of the course. Incomplete grades (I) are never automatic and, in fact, are highly undesirable. Please complete the course work to the best of your ability during the semester. If you fall behind, please reach out as soon as possible so we can get you back on track.

Use of Computers and Phones in Class
You will need to use Microsoft Office productivity applications, MS Teams for group work, VS Code for web development, Filezilla for uploading files to a server, Edge, and Chrome browsers, and other applications as part of the coursework in this class. You will learn to install these at a Jumpstart session early in the semester.

This is a technology class, so of course you can use your mobile device for class-related purposes. (Texting, sending messages on Messenger, watching the latest World Cup soccer match, and checking Facebook are not usually class related purposes.) Keep your phone silent so ringtones and notifications do not disturb the course. Follow instructions regarding the use of computers and mobile devices during exams.

Broken computers are not an excuse for late work. You must find an alternative means for getting work done on time. Computers and printers are available in the library, and most computers on campus in have the software you need already installed. If you cannot complete any exam or assignment due to a broken or damaged computer, you will not get credit for it.

Please be sure your laptop is charged or plugged in so that you can follow along with any handouts or software demonstrations. You may also use your computer to take notes during class.

Back up all work onto your OneDrive, e-mail, a cloud storage account, or portable storage device so it is readily available from multiple locations.

[Information on university standard course policies (attendance, academic integrity, religious observances) and information about university resources (disability services, academic services, library, tutoring centers, diversity and inclusion, Title IX, etc.) are omitted.]

Sample CS 100 Topics and Schedule

		Tuesday		Friday
Jan	24	Welcome to CS 100! Set Up Ebook Accounts	27	Course Introduction
	31	MS Teams, OneDrive, Collaboration and Teamwork	3	Excel 1 – Getting Started
Feb	7	Concepts 1 – Digital Content	10	Excel 2 – Formatting
	14	Concepts 2 – Digital Devices	17	Excel 3 - Formulas and Functions (1)
	21	Concepts 3 – Networks	24	Excel 3 - Formulas and Functions (2)
	28	Concepts 4 – The Web	3	Excel 4 – Analyzing and Charting
Mar	7	Router Lab	10	Midterm Exam
	14	Spring Break	17	Spring Break
	21	Web 1 – HTML Structure, Links, FTP Mobile Apps Lab (ungraded)	24	Excel 5 – Generating Reports
	28	Web 2 – Styles and Images	31	Excel 6 – Managing Data
Apr	4	Web 3 – Embedded Content	7	Business Applications of IT
	11	Concepts 5 – Social Media Concepts 6 – Software	14	Excel 7 – Pivot Tables
	18	Special Topics (Internet of Things, Artificial Intelligence)	21	Excel 12 – Developing an Excel Application
	25	Concepts 7- Digital Security	28	Review
		Concepts 10 – Databases (on your own)		
May	2	Reading Day (No Classes Held)	5	Final Exam

Each concepts chapter test is a ten-question multiple choice quiz: that is due at the start of class on the day the topic is listed. The chapter test will open seven days before discussing the chapter in class.

Each Excel module has a tutorial and a project. The tutorial is due the day after we cover the topic in class, and the project is due one week after learning the topic in class.

Sample IT 101 Topics and Schedule

		Monday		Wednesday
Aug	27	Course Introduction	29	Using Your PC in IT 101
Sep	3	Labor Day, No Class	5	Concepts 1 - Digital Literacy
	10	Excel 1 – Getting Started	12	Concepts 2 – The Internet
	17	Focus on HTML – 1st class	19	Excel 2- Formattng
	24	Focis on HTML 2nd class	26	Excel 3 - Formulas and Functions
Oct	1	Focus on HTML 3rd Class	3	Excel 4 – Charts and Financial Data
	8	Fall Break / No class	11	Excel 4 – Charts and Financial Data
	15	Concepts- Computers and Mobile Devices	18	Midterm Exam
	22	Excel 5 - Tables, Filters, Sorting	25	App Development
	29	Concepts – Communications Networks	31	Excel 6– Multiple Worksheets
Nov	5	Excel 7 – Macros and Data Validation	7	Router Lab
	12	Input/Output/Storage	14	Thanksgiving Break
	19	Operating Systems	21	Advanced Functions in Excel
	26	Concepts 7- Digital Security	28	Hands On Lab
Dec	3	Concepts 10 – Databases	5	Review
	9	Final Exam		