ISAT 348—Web & Mobile App Development

Fall 2017

Course Overview

ISAT 348 is the last course in the ISAT IKM programming sequence. Here's how it fits in with the other courses:

- ISAT 252: Introduction to Basic Programming Concepts
- ISAT 340: Learn How To Turn Ideas Into Software
- ISAT 345: How To Build Software in Large-ish Teams
- **ISAT 348: New & Cutting Edge Skill Acquisition for Software Development**

Essentially, by this time you should have a pretty decent idea of how software gets built. You should have developed enough of a background that you have some ideas about where you'd like to dig deeper. This is a class that is designed to give you just that opportunity.

And in case you're not inspired yet, here's Clay Shirky talking about how Git and GitHub embody the spirit and philosophy of true Democracy, and how coders may lead the way to our shining Utopia:

Grades

Your grade this semester will be based upon a point system. You earn points by earning badges. Each badge has a certain number of points associated with it. The point cutoffs for various grades are in the table below. I will not round or curve. You are responsible for keeping yourself on track. To get an “A”, you need to be earning 8-10 points a week, on average. There should be plenty of opportunities to earn points. If for some reason, you find yourself without anything to do, please take your prof out for coffee (you can earn a point that way), and we can come up with a plan for you. ***Please see the important caveat to this grading system in the attendance policy below.***

Grade	Points
A	129-150
A-	120-128
B+	111-119
B	99-110
B-	90-98
C+	81-89
C	69-80
C-	60-68
D+	51-59
D	39-50
D-	30-38
F	0-29

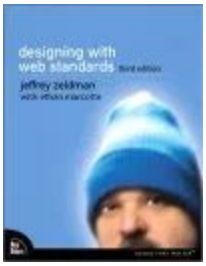
Attendance Policy

Attendance is mandatory. I will take attendance at the beginning of every class period. If you are not there when your name is called, you will not get credit for being there. If you are marked absent more than five (5) times during the course of the semester for any reason, your semester grade will drop by one letter. Woody Allen said, “80% of success is just showing up.” I care if

you're here. **Please note, even an "excused" absence counts toward one of your five absences!!!**

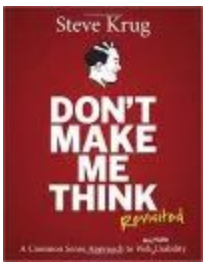
Some Interesting Books

There are NO required textbooks this semester. That being said, if you are really serious about becoming a rockstar programmer, here are some books that I highly recommend. If you do take the time to read a book, I'll definitely create a badge that gives you the opportunity to earn some points for it. If there's a book you want to read that's not on this list, come talk to me beforehand and I'll let you know if I think it's worth your time.



Jeffrey Zeldman's Designing with Web Standards, 3rd Ed. is absolutely a classic. If you'd like to have a deep understanding of where the web came from and how it got to where it is now, this is a must-read book. It's relatively short, entertaining with lots of stories and pictures, but it will also instill an appreciation for standards and for sound design techniques. The chapters on CSS basics, and especially the discussion of typography are well worth the time.

I like Jason Beaird's The Principles of Beautiful Web Design, 3rd Ed. because as someone who is not really a very good designer, this book has a lot of easy-to-follow steps for doing things like choosing colors, organizing layout, and considering the flow of a website. It gives some really good insight into how designers think, and clues as to how to work effectively with them. This is another book with beautiful imagery, and it's probably given me more confidence than I deserve to have as a designer.



Steve Krug's Don't Make Me Think (Revisited): A Common Sense Approach to Web and Mobile Usability is a fantastic introduction to a topic that people continue to get appallingly wrong again and again. People get so tied up in what they think of as "cool design" that they neglect to realize that they are making their websites harder for people to use. This translates to poorer online sales, or just having your website visitors fail to accomplish what they came to do. Another highly-recommended read.

Two Strategies for This Class

I really think of this class as a time for advanced students to explore territory that they haven't had a chance to get to so far in their ISAT career. As such, here are two ways that I think would be good to get the most out of our time together:

Strategy #1: Project-Focused Semester

One way to go about this class is to come up with one project, and then figure out what skills you need to complete it. You should follow the rough timeline that we did in ISAT 340, and work toward making a presentation of your work at the end of the semester. If you are doing a capstone project that could benefit from programming work, I think it's a great opportunity to use this class to build the skills you need for your capstone. Of course I strongly encourage you to collaborate with your classmates. I think teams should be limited to three, or maybe four, but even if it is only two people on a team, it will certainly be more fun, and you'll probably get closer to your goal.

Strategy #2: Random Basket of Tech

Another way to go about this class is to follow your nose. Are you curious about how to do Virtual Reality (VR) or Augmented Reality (AR) programming? Perhaps you'd like to know how to build an e-commerce website. With this strategy, you can pick a new technology every 1 or 2 weeks and focus on it until you've built something small and developed an understanding of the basic principles. You should plan to meet with me every two weeks or so to show me your expanding portfolio of mini-projects.

Schedule

The schedule for this class is somewhat flexible and constantly evolving. Stay tuned!

Topics Worth Spending Time On

- Technologies:
    - Basic, client-side web standards (HTML5, CSS, Javascript)
    - Popular, server-side web standards (PHP/Python/Ruby)
    - Relational database analysis, design, implementation, and integration (SQL, MySQL)
    - NoSQL database analysis, design, implementation (MongoDB, CouchDB, Redis, etc.)
    - Object-Relational Mapping tools (ORM) and Object-Oriented Programming (OOP)
    - Source code management (Git/Github)
    - Web protocols (HTTP, (S)FTP)
    - Popular web servers (Apache, Nginx, Node Express)
    - Web frameworks and CMS (WordPress/Laravel/Django/Rails/Angular/React)
- Professional Skills:
    - Creating and managing a web hosting account

- Setting up a (team) development environment
- Coding and documentation following standards and style guides
- Test-driven Development (TDD)
- Proposal writing for web/mobile/software projects
- Package management
- Debugging and code review
- Open-source culture and communication

Important Dates and Deadlines

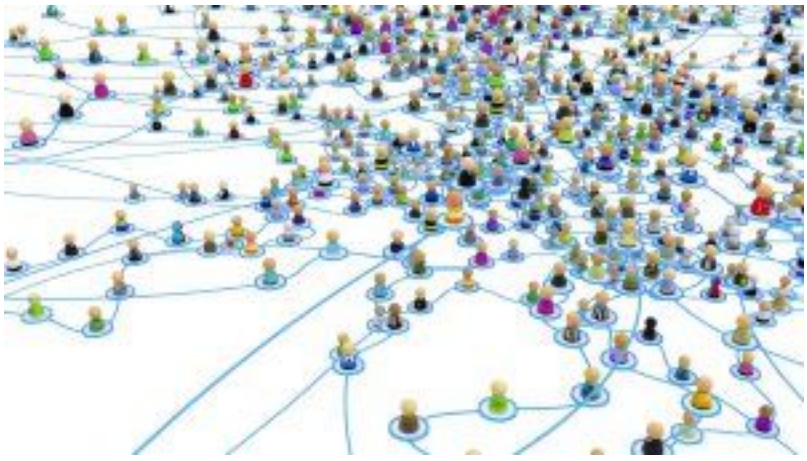
At the behest of the registrar, a list of dates you may wish to take note of:

- Tuesday, September 5th: Last day of add/drop
- Thursday, September 14th: Last day to add a class with Department Head signature
- Friday, September 15th: Last day to withdraw from JMU with charges canceled

So if I scare you off, get out early. Or conversely, if I turn you on, join us soon!

My academic integrity policy is different from JMU's standard policy, but I will adhere to JMU's standard policies listed on the JMU Syllabus Information for Students page with respect to add/drop, disability accommodations, inclement weather and religious accommodations.

What is "Learning"?



Learning is Essentially Relational

The dominant definition of learning in our society is based on psychometrics, or the measurement of psychological properties. Because the amount someone has learned can't be directly observed, we infer learning using tests or other student-generated artifacts. Although we can never know exactly what a person knows or can do, we believe we can make a pretty good guess by giving them tests and scoring the results. In abstract terms, learning equals the difference in performance of a person over time, or:

$$t_1 - t_0 = learning$$

More concretely, if you give someone a test at the beginning of the course and they get a 62%, then give them a test at the end of the course and they get 92%, then we define learning as:

$$92 – 62 = 30$$

Unfortunately, there are no standardized units of learning, as we have with say money, or weight, or temperature. Therefore we really have no way to interpret such scores in a reliably meaningful way. Fortunately, though, there are other ways to define learning that don't have the same kinds of problems.

A better definition of learning, in the sense that it takes into account the contextualized and systemic aspects of learning, comes from Moss (2003) who said:

> *From a sociocultural perspective, learning is perceived through changing relationships among the learner, the other human participants, and the tools (material and symbolic) available in a given context. Thus learning involves not only acquiring new knowledge and skill, but taking on a new identity and social position within a particular discourse or community of practice. As Wenger puts it, learning "changes who we are by changing our ability to participate, to belong, and to experience our life and the world as meaningful." (p14)*

Learning is, at its core, an artifact of relationship. It's fundamentally a social process because we need the mirror provided by others to help us recognize and apply our gifts and talents. In more concrete terms, as a result of learning, I go from being "that guy who works down the hall" to being "that guy who works down the hall and is a great web developer." As a result of learning, people come to see us differently, and they begin to approach us and rely on us to contribute our gifts and talents back to them.

Personal Integrity Policy

First:

> **If I catch you cheating, or doing anything else dishonest, you will fail the course. Period.**

Second, that being said, I strongly encourage sharing and collaboration in most every aspect of the course. That means that I think it's a smart idea for you to:

- Download code you find on the web (include the URL of where you found it and some notes about how you got there)
- Download your classmates' code and use it, even before an assignment is due
- Pay someone to help you write code

- Get code from upperclassmen or people in previous semesters
- Ask your neighbor to give you a hint on a question on a test that you're stumped on
- Use whatever notes, websites, books, or other materials you need to complete most any assignment or test

You'll note that many of the above behaviors would be considered "cheating" in many or most other courses. Here are some guidelines I'd like you to follow:

- Never EVER copy without attribution
- Even on tests, if someone or something helped you out, acknowledge it. Make notes in your code if you got it from someone or somewhere else. Copying without attribution is stealing and is a breach of integrity. If you got the code off of the web, there should be a URL and some notes about how you found it. If you paid someone to help you write it, say so.
- Never copy without understanding
- The point of the class is to learn and understand stuff. Since you don't get any grades on individual tests or assignments, it's pretty stupid to copy something that you don't understand. Think about it. What point could it possibly serve?
- Be very hesitant to copy an ENTIRE project
- While there's a lot to be gained by incorporating parts of your classmates' code in your own project, copying someone else's entire project doesn't really provide you much of a learning experience and wastes people's time.
- Try to figure it out yourself first
- 90% of writing programs is learning how to write them, and this will stay the same throughout your entire programming career. Being a self-sufficent learner is one of the primary goals of the course.

Code re-use is a HUGE part of hacker culture. What hackers hate more than anything is not understanding stuff. I want you to get a sense for what it's like to be a part of the fun world of professional hackers.

Okay, so what do I consider a breach of integrity worthy of failure?

- Lying about anything to anyone in the class
- It could be as trivial as the reason why you didn't show up for class or do your part of a group assignment. Everybody screws up sometimes. Don't compound the mistake by lying about it. We can forgive mistakes but it's VERY difficult to regain trust once it's broken. Swallow your embarrassment or fear and fess up.
- Stealing anything–this includes copying without attribution
- Stealing is just wrong, and since you have a blanket license to copy most any code you can find, there's no reason not to give people credit for the work they did. Passing someone else's original work off as your own is frankly disgusting.
- Threatening, antagonizing, or intimidating anyone in our learning community

- This is unacceptable behavior and will get you at least fired, if not sued in most every company you'd ever work for.

If you are in doubt about something, please ask your prof. Please feel free to come speak to your prof in confidence about anything in this course that troubles you. So far at JMU I've never had a problem with anyone's integrity (that I know about). Don't be the first group to ruin my perfect record. Thanks!

The Lead Coder

Hi, I'm Morgan. I'll be the lead coder for this journey.

As I've said:

Learning is essentially an artifact of relationship

So, in order to lead by example, here is a brief overview of my relationships, who I know and who knows me, and what roles we've played in each other's lives. But first, here's how you can begin relating to me:

Key Info

Office	EnGeo 2118 (office hours/coffee by appointment)
Email	bentonmc@jmu.edu
Cell	973-495-7736
Social	

Academic Community

Undergrad

I got a BA in Leadership Studies and Sociology (with a minor in Physics) in 1996 from the University of Richmond and the Jepson School of Leadership Studies. (Jepson is kinda like ISAT, but for social science.) For my capstone I went to Capitol Hill and surveyed the IT directors of US Senators to try to figure out if the people who were making and passing laws about technology had actually ever used a computer. I was inspired to do this by an online petition I received related to some of the scarier provisions in the Telecommunications Act of 1996. I was supported in my efforts by my professor Joanne Ciulla, whose unorthodox ideas (see her book The Working Life: The Promise and Betrayal of Modern Work) helped me become

an outside-the-box thinker. My capstone partner, Elizabeth MacKenzie Biedell, went on to work for the US State Department where she staffed Colin Powell, the CIA where she briefed the White House, and has become an advocate for information sharing and against the over-classification of intelligence.

As an undergrad I did a lot of community service. I helped Richmond Habitat for Humanity raise close to $50,000 and build four houses. I got schooled in basketball by kids at the Sacred Heart Center while I was volunteering in their after school program. I helped feed meals to homeless men, and learned a lot from them in the process. I left college with a deep commitment to serve, inspired by the words of one of my best friends, the Associate Chaplain David Dorsey, who said: There's nothing very "high" about "higher education" if it doesn't give something back to the community from which it was taken.

Another of my mentors was Richard A. Couto (who insisted that we call him Dick–very hard to do with a straight face if you're my age). I helped Dr. Couto produce An American Challenge: A Report on Economic Trends and Social Issues in Appalachia. My job was to turn US census data into maps–perhaps the first time that I employed computer technology to help effect social change, this time for poor people in the Appalachian region.

These are just a few of the many people with whom I connected as an undergrad, who influenced me, and with whom I continue to connect to solve real problems for real people.

Grad School

I got an MS and PhD in Information Systems from New Jersey Institute of Technology. It took me TEN YEARS (1998-2008)! For my dissertation, I built a web-based system to help teachers write better multiple-choice questions (MCQs). (Spoiler: it didn't really work.) In actuality, I hate multiple-choice questions and multiple-choice tests. My system was designed as a Trojan horse (figuratively–it was NOT spyware) to convince teachers that MCQs are more trouble than they are worth. This grueling journey solidified my lifelong ambition to radically change education globally.

Along the way, I was lucky to receive guidance from Dylan Wiliam, one of the world's foremost scholars on formative assessment. I met Dr. Wiliam while I was a graduate intern at ETS (you know, where they make the SAT and GRE), and he taught me a painful and enduring lesson–technology is not always the answer. His 1998 meta-analysis of hundreds of studies of classroom assessment has grounded and guided my teaching practice and research ever since.

Starr Roxanne Hiltz and Murray Turoff were the Distinguished Professors at NJIT who gave me my job there and made it possible for me to support my family while getting my PhD. They predicted the age of the Internet way back in 1978 in their book The Network Nation. They were pioneers in online education, and there are still many of their ideas that haven't yet been implemented in modern online learning management systems.

I was teaching four courses per semester throughout my time at NJIT. I may have learned more from my students than from any other source. It was from my students that I learned humility, flexibility, and to see just how vicious the system is that binds us all together. I still have relationships with a number of them, and they continue to keep me on my toes.

Of course, my most important relationship in grad school was with my advisor, Marilyn Tremaine. Marilyn was one of the founding mothers of the field of human-computer interaction (HCI) and helped create one of the most vibrant and successful academic communities (the ACM's SIGCHI) of the last several decades. She let me live in her house. She showed me that even if I've been a total slacker, there's always something productive we can do with this week's meeting.

JMU

I began at JMU in August 2006 and have been here for over a decade. It is here that I've had the opportunity and freedom to put into practice many of the innovations in teaching that I've discovered over the years. The ISAT department deeply values creativity and autonomy, so while my colleagues may have offered (sometimes sharp) criticism over the years at my methods, nobody ever told me to stop, and many encouraged me to keep moving forward. I deeply value this aspect of the ISAT Department–the willingness to take risks to achieve great things.

That being said, it is my students who have had the biggest influence on me. It was Brian Rapp (ISAT '10), who, as my TA, first goaded me into trying my choose-your-own-grade strategy back in the spring of 2009. It was my capstone students who helped me write much of the software that I use in my teaching. It continues to be students like Cyril Thornton ('10), Adam Maas ('12), Chiedo John ('13), and Josh Erney ('14) who regularly ping me about new tech developments that help keep me at the cutting edge of my field. I feel deep gratitude every time a student opens up to me and allows me to play a part in their story.

I would be remiss if I didn't mention Nicole Radziwill. We teach together, research together, play together, live together. We started the Burning Mind Project together. We've published over half a dozen papers together and applied for over a million dollars in funding together. We've been to Burning Man three times and it is from her that I am constantly challenged to try new things, examine who I am, and continually reinvent myself.

There's plenty more to learn about me, and I strongly encourage everyone to invite me out for coffee or lunch or something! I look forward to getting to know each and every one of you better.