This is the senior undergrad capstone course. In this course your will apply the pre-req knowledge you gained in your Core and ITM electives course to produce an complete cloud native application deployed from scratch using best practices.

The textbook we will use are a guide:

**DevOps Handbook - How to Create World-Class Agility, Reliability, & Security in Technology Organizations**

Gene Kim, Patrick Debois, John Willis, Jez Humble, John Allspaw (Foreword by)

<http://www.barnesandnoble.com/w/the-devops-handbook-gene-kim/1121371901?ean=9781942788003>

bevOps 
Handbook 
HOW TO 
'N TECHNOLOGY ORGAN'ZA"ONS 

**The Twelve Factor App**

<https://12factor.net/12factor.epub>

These will be referenced in the few lectures and will need to be cited in the final paper.

**Outline**

The course will consist of small teams with the end goal of developing an entire application environment:

This would include:

* Building a Test environment
* Building a Production environment
* Creating Automated Infrastructure and Application Deployment
* Use of a build system
* Unit Tests
* Debugging and UI testing
* Project management and Issue tracking
* Team collaboration and communication

Each group will consist of 4 or 5 people (or as close as possible)

And include defined roles as--roles can be shared or duplicated, but one person must be responsible for each category. Descriptions start with but are not limited to:

* **Project Manager**
  + Making sure resources are allocated and schedules are met
  + Solving bottlenecks and developer issues
  + Reaching out to customer (me) for objective clarifications
  + Delivering the product
* **Developer(s)**
  + All of the coding and business logic
  + Coordinate with Operation on choice of language, database, server platform (stack)
  + Working with Operations to deploy a seamless automated deploy
  + Interact with school's OTS to implement CAS authentication (using your @hawk credentials)
  + Work in conjunction with operations to create business Metrics and implement a metrics and logging system
* **Operations and Infrastructure (Ops)**
  + Creating all infrastructure via scripts or code for fully manual deployments
  + Setting up the project information to use Jenkins for automated testing and building
  + Working with developers to solve issues
  + Work in conjunction with developers to create business Metrics and implement a metrics and logging system
* **UI/Designer and Tester**
  + Developing a coherent user interface
  + Developing a consistent branding
  + Developing use of CSS/JavaScript methods
  + Testing user functionality
* **Security**
  + Responsible for preventing security vulnerabilities in the application (it happened last semester one group was lazy and got hacked)
  + Implementing Database encryption
  + Securing all RSA keys, passwords, and other sensitive data
  + Acquiring [Let's Encrypt](https://letsencrypt.org/) HTTPS certs
  + Requesting DNS adjustments
  + Choosing and integration of opensource license

**Team Projects include a choice from:**

* **Project Factor** (large project with front end and back end - two teams could join on this one potentially)
  + <https://github.com/illinoistech-itm/factor>
* **Bugoverflow**
  + Like stackoverflow but for identifying various insects found around your house/garden
* **Hawkstagram**
  + A photosharing/tagging infrastructure for internal university use
* **Illinois Tech @WithU** ride share application with commuter students
  + An application developed internally to help connect commuter students
* **Project Guest Pass**
  + <https://github.com/illinoistech-itm/guestpass>  
    <https://forge.sat.iit.edu/2016/08/project-guest-pass-gpu-passthrough-in-linux-kvm-summer-2016-bsmp/>
* **Project Manhunter**
  + <https://github.com/illinoistech-itm/manhunter>
  + <https://forge.sat.iit.edu/2016/08/project-manhunter-side-channel-leakage-abuse-attack-bsmp-summer-2016/>
* **Illinois Tech @Home** (Dorm reservation system)
  + Work with OTS to develop - using SalesForce (they will train)
* **Multi-site Wordpress** 
  + As a replacement for the iNuggets system used in IPRO

**Course Content:**

There will be weekly standup meetings to show progress. There will be a few initial lectures and environment setup lessons. Recommended to purchase an external USB Harddrive (more space the better) and dongles if you need them (looking at you Mac people) for wired Ethernet.

**Final Deliverable:**

Will be a group presentation outlining your initial goals, what you learned, and what you accomplished. Presentation will be given in front of live audience. Along with a live deploy of software.

In addition you will provide on group paper with each person outlining their primary and any secondary roles, citing sources from the textbooks, of what you accomplished and why you were able to accomplish that and what you learned from this endeavor (self-reflection)

This paper, if done well, can be used by you to take directly to interviews at tech companies.

**Outline**

1. **Week 1** - Chapter 1-2 - Introduction to High Performance Organizations
   1. Gene Kim: "The 3 ways" presentation
   2. Chapter 1, Agile, Continuous Delivery, and the Three Ways
   3. Discover teams and accept topic assignments
2. Lab - Tools overview and setup.
   1. Chapter 2 - The first way: The Principles of Flow
      1. Make our work visible (Kanban)
      2. Limit Work in Progress (WIP)
      3. Small batch vs large batch
      4. Reduce the number of hand-offs
      5. Always identify system constraints
         1. Environment Creation
         2. Code Deploy
         3. Setup and Run
         4. Overly tight architecture
   2. Accept Trello team invite
      1. Work on Kanban Tooling with team assignment of job roles
      2. Git and PHP Codecademy lessons
3. **Week 2** - Chapter 3 & 4 Principles of Feedback and Continuous Learning
4. Lab
   1. Short group presentation of your topic and your chosen team roles
   2. Github issues
   3. Slack - accept invitation to Slack channel
   4. Vagrant and Packer installs
5. **Week 3** - Chapter 5 & 6 - Selecting Which Value Stream to Start With, Understanding the Work in our Value Stream
6. Lab - Chapter 9 - Create the foundations of our Deployment Pipeline
   1. CI/CD integration with GO/SNAP and/or CloudBees/Jenkins
7. **Week 4** - Chapter 10 - Enable Fast and Reliable Automated Testing
8. Lab - Chapter 11 - Enable and Practice Continuous Integration
   1. Unit test integration
9. **Week 5** - Chapter 14 - Create Telemetry to solve problems
10. Lab
    1. Use of consul
    2. Syslog
    3. Logstash
    4. Metrics vs. Monitoring
11. **Week 6** - Professional, Ethical, and Legal Issues - Part I
12. Lab - Professional, Ethical, and Legal Issues - Part II
13. **Week 7** - Local and Global Impact of Computing - Part I
14. Lab - Local and Global Impact of Computing - Part II
15. **Week 8** - Midterm live demo presentation and 1st paper submission (Practice)
16. Lab - Midterm live demo presentation and 1st paper submission (Actual)
17. **Week 9** - In class standup meeting & project development
18. Lab - In class project development
19. **Week 10** - In class standup meeting & project development
20. Lab - In class project development
21. **Week 11** - In class standup meeting & project development
22. Lab - In class project development
23. **Week 12** - In class standup meeting & project development
24. Lab - In class project development
25. **Week 13 -** In class standup meeting & project development
26. Lab - In class project development
27. **Week 14 -** In class standup meeting & project development
28. Lab - **Presentation Practice**
29. **Week 15 -** In class standup meeting & project development
30. Lab - **Presentation Practice**
31. **Week 16 - Final Exam -** Presentation group project in class during final exam time