

Course Introduction Lecture Notes

SWEN 438 (2021) - Special Topic: DevOps

Directly after welcoming everyone, show the University [Event Safety Video](#) (YouTube).

Run-through the Course Outline, the Course Wiki, Blackboard and GitLab sites. This is standard "housekeeping" stuff.

Course Outline

URL: <https://www.wgtn.ac.nz/courses/SWEN/438/2021/>

Run through, section-by-section.

Assessment Structure

We have aimed to "reduce the batch size" by breaking a smaller number of large assessment items into a larger number of small items.

- Assignments and laboratories will often require students to maintain their work in GitLab for assessment purposes in <https://gitlab.ecs.vuw.ac.nz/course-work/swen438/2021/username/>
- Assignments are not all equally weighted, Assignment 3 runs over the mid-trimester break.
- Laboratories support the technical work in the assignments.
- All of the course, lectures, readings and assignments, may be tested in the final assessment item.

Submission

Note: *both* Blackboard and the ECS submission system will be used for submission and may require the submission of a link to git repositories in GitLab.

Extensions

The [Assessment Handbook](#) (PDF) provides guidance regarding what constitutes *exceptional personal circumstances*.

Workload pressure "such as having three or four major pieces of work due in a short period with insufficient time over the trimester to adequately manage them" is also grounds for granting an extension, noting the comment in section 4.2:

The development of work discipline and time management skills is an important part of the educational process and it is expected that each student takes responsibility for allocating sufficient time for their studies.

The Vice-Provost (Academic) has advised "Course Coordinators are expected to be flexible where it is appropriate and helpful." For short extensions (one week or less) "no evidence in the form of a medical certificate will be required."

Penalties

No submissions will be accepted after 3 days.

The Course Outline is also available from within the course wiki.

Course Wiki

URL: https://ecs.wgtn.ac.nz/Courses/SWEN438_2021T2

The course wiki is the primary place where course information may be found, of particular note are the Course Outline, Lecture Schedule, Assignments, Reading List and links to the Expectations of ECS Students.

Lectures

Laptops are encouraged: some of the lectures will have live demonstrations, *please* feel free to follow-along on your own device during the lecture.

We have requested an additional lecture slot, Friday 13:10-14:00, which will be used *some* of the time. The Lecture Schedule will show which Friday lectures will be used.

Lectures will be webcast and a recorded version should be available within 3 hours of the end of the lecture.

Assignments and Laboratories

Details of assignment briefs and laboratory exercises will be posted to these Topics in the course wiki.

The first laboratory is *tentatively* scheduled for course week 3, Wednesday 20 July from 13:10-14:00 in Cotton CO238.

Collaboration and Group Work: All assessment in SWEN 438 is individual. Some assignments may take place in the context of group exercises (it's a DevOps course, after all!) but individual performance will be assessed.

Academic Integrity: ECS encourages students to discuss questions and to share perspectives in a

collaborative manner *prior* to individually formulating answers expressed in their own words and ideas for assessment.

Reading List

The Talis reading list is where all of the course readings can be accessed.

Expectations of ECS Students

These expectations have shaped the approach to course construction, so it's worth paying some attention to these expectations.

SWEN 438 Blackboard

The course Blackboard site is linked from the left bar of the course wiki. Lecture recordings are available from the [VStream Videos](#) and some assignments will be run via Blackboard.

Class Representative Selection

<http://www.vuwsa.org.nz/class-representatives/>

YouTube Video: <https://www.youtube.com/watch?v=TdADUaxh-Qk> (linked from VUWSA page).

What is DevOps?

There are many definitions...

DevOps is a software development and delivery methodology that provides ... increased speed and stability while delivering value to organisations.

Forsgren, *DevOps delivers*, Communications of the ACM **61**, 32 (2018).

DevOps, whether in a situation that has operations engineers picking up development tasks or one where developers work in an operations realm, is an effort to move the two disciplines closer.

Roche, *Adopting DevOps practices in quality assurance*, Communications of the ACM **56**, 38 (2013).

DevOps is a collaborative and multidisciplinary effort within an organisation to automate continuous delivery of new software versions, while guaranteeing their correctness and reliability.

Leite *et al.*, *A Survey of DevOps Concepts and Challenges*, ACM Computing Surveys **52**, 127 (2019).

These focus on the outcome or the foundations of the discipline. To understand the DevOps method, the acronym CALMRS is often used.

CAMS, CALMS and CALMRS

The acronym has evolved as DevOps practice has become established and now comprises CALMRS:

- Culture
- Automation
- Lean
- Measurement
- Reliability
- Sharing

Culture

Integration of mutual trust, willingness to learn, continuous improvement, constant flow of information, open-mindedness to changes, and experimentation between developers and operations.

Wiedemann *et al.*, *Research for Practice: The DevOps Phenomenon*, Communications of the ACM **62**, 44 (2019).

Automation

Implementing deployment pipelines with a high level of automation (most notably continuous integration/continuous delivery) and comprehensive test automation.

Wiedemann *et al.*, *Research for Practice: The DevOps Phenomenon*, Communications of the ACM **62**, 44 (2019).

Lean

Applying lean principles such as minimisation of work in progress, as well as shortening and amplification of feedback loops to identify and minimise value flow breaks to increase efficiency.

Wiedemann *et al.*, *Research for Practice: The DevOps Phenomenon*, Communications of the ACM **62**, 44 (2019).

Measurement

Monitoring the key system metrics such as business or transactions metrics and other key performance indicators.

Wiedemann *et al.*, *Research for Practice: The DevOps Phenomenon*,

Communications of the ACM **62**, 44 (2019).

Reliability

Robust to faults external or internal to the system, able to scale automatically in response to load and to recover automatically or semi-automatically from failure.

... faster, safer and easier to change.

DevOps Handbook.

Sometimes also expressed as Recovery or Recoverability.

Sharing

Sharing knowledge in the organisation and across organisational boundaries. Team members should learn from each other's experiences and pro-actively communicate.

Wiedemann *et al.*, *Research for Practice: The DevOps Phenomenon*,
Communications of the ACM **62**, 44 (2019).

Culture is Key

We start the course with DevOps culture because culture is key:

- automation is not about scripts,
- continuous integration and deployment are not about automated pipeline tools,
- monitoring is not about creating telemetry,

rather, they are *cultural practices of DevOps*.

... changing tools and technologies without changing the culture is often called "cargo-cult DevOps" since it changes the facade without addressing the weakness in the foundation

Atlassian, *What is DevOps Culture?*

<https://www.atlassian.com/devops/what-is-devops/devops-culture>

The conceptual arc of the course moves from Dev to Ops, following the CALMRS structure.

The DevOps Lifecycle

The ∞ lifecycle links both with CALMRS and with the conceptual arc of the course from Dev to Ops.

Version control is the technical basis of the DevOps Lifecycle: *Everything is Code*.
