

High Performance Distributed Computing - Course Outline

NWEN 406: 2010 Trimester 2

This document sets out the workload and assessment requirements for NWEN 406. It also provides contact information for staff involved in the course. If the contents of this document are altered during the course, you will be advised of the change by an announcement on the course web site.

School of Engineering and Computer Science

The School office is located on level three of the Cotton Building ([Cotton 358](#)).

People

The course organiser for NWEN 406 is [Kris Bubendorfer](#). My contact details are:

- [Cotton 335](#)
- +64 4 463 6484
- kris@ecs.vuw.ac.nz

Introduction

This course focuses on the principles, techniques and infrastructure needed to support computation in which elements of that computation experience distribution over a set of computing resources. The course will include detailed examination of current approaches such as grids, clouds, and service oriented computing. This is a research-oriented reading course, as such students will need to be self directed, and the project work will be largely self selected.

Objectives

High Performance Distributed Computing is part of the Engineering program at Victoria University of Wellington. BE graduates are expected to exhibit a number of graduate attributes at the completion of the program. This course contributes to the graduate attributes (GA) as indicated below. A full table of these attributes is available at [Graduate Attributes](#).

By the end of the course, students should be able to explain (GA [3\(a\)](#) & [3\(b\)](#)):

1. *What a large scale distributed computing system is, what it does, and how it is designed and constructed,*
2. *eScience, how large scale distributed systems are leveraged to enable science in a range of fields,*
3. *alternative management paradigms for large scale distributed systems,*
4. *alternative programming models for large scale distributed systems,*
5. *basic mechanisms for protection and system security.*

The programming project has been selected to emphasise these important high performance distributed systems concepts, resulting in:

1. *experience in writing distributed code in a production Grid (GA [3\(d\)](#) & [3\(e\)](#) [3\(f\)](#)),*
2. *an appreciation of design in the selection of parallel algorithms (GA [3\(b\)](#) & [3\(c\)](#)),*
3. *an appreciation of the user experience (critical in eScience) (GA [2\(b\)](#))*
4. *familiarity with UNIX/Linux; C or Java programming, Grid APIs (GA [3\(f\)](#)).*

In addition to these objectives and graduate outcomes, the seminars and project presentations fulfill GA [2\(b\)](#) and the essays directly address GA [3\(d\)](#).

Lectures

NWEN 406 will be taught as a reading course, and as such will not have formal lectures. We will utilise a combination of individual and small group meetings.

- There will be 5, 2 week topics. Each topic will require a essay on the material set (between 4-6 research papers).
- Topics:
 1. **Week 2 & 3:** Architectures I: Clusters, Grids, Clouds and Volunteer Computing;
 2. **Week 4 & 5:** Architectures II: Clusters, Grids, Clouds and Volunteer Computing;
 3. **Week 6 & 7:** Case Studies in e-Science;

4. **Week 8 & 9:** Paradigms: Service Oriented Architectures, Autonomic Computing and Semantics;
5. **Week 10 & 11:** Utility and Market Oriented Computing.

Contact Scheme will be: meet on even numbered weeks.

Essays

Essays are the primary assessment in 406. There will be 5 essays, worth 10% each. Essays will be due on odd (3, 5, 7, 9 & 11) numbered weeks, commencing with week 3. Each essay will be at least 5 pages in length and be based on the readings set for the assigned topic. You are expected to perform your own literature searches, and the set readings should only form part of your reference list.

I intend to return your marked essays in 1 week, so that you can receive feedback before the next topic essay is due. Due to the tight timing requirements on the marking and feedback, and the assignment of seminars - essays must be handed in on time.

Please look at the statute on plagiarism. All essays will be checked for plagiarism. Essays that are deemed to contain plagiarized material will not be marked. I will give a presentation in class on how to reference, quote and properly credit source material. This includes, text, images, graphs, figures etc.

Seminars

There are 2 15 minute seminars per student. Seminars will be allocated based on the essays and be presented in even numbered weeks. You will only have a short time to prepare the seminars, so you must take this into account in planning your work schedules. You will be advised if you have been selected for the following weeks seminar by email and on the website. If your seminar is inadequate you may be asked to repeat it.

Tutorials

There will be at least one lab tutorial - probably in week 4 (to be confirmed).

Textbook

There is no set textbook for NWEN 406. Readings will be set from an assortment of published material.

Assignments and Projects

There will be 1 large programming project. This will be set in week 3 and due in week 9. In this project you will select an 'embarrassingly parallel' problem of your choice and implement a working grid solution on our Sun Grid Engine ECS grid. You will need to submit your project plan in week 5 for approval. The project plan will include a comprehensive analysis of the problem and a preliminary a solution design. In week 11 we will hold a 'tech fair', in which all projects will be demonstrated and marked. The demonstration will include the final project report and evaluation, a poster, and the demonstration and oral presentation. Attendance is compulsory.

Workload

In order to maintain satisfactory progress in NWEN 406, you should plan to spend an average of at least 10 hours per week on this paper.

Assessment

Your grade for NWEN 406 will be determined based on the following assessment weightings:

Item	Weight
Essays (x5)	50%
Seminar (x2)	10%
Project (x1)	40%

Tests and Exams

There is no exam in NWEN 406.

Plagiarism

Working Together and Plagiarism

We encourage you to discuss the principles of the course and assignments with other students. to help and seek help

with programming details, problems involving the lab machines. However, any work you hand in must be your own work.

The School policy on Plagiarism (claiming other people's work as your own) is available from the course home page. Please read it. We will penalise anyone we find plagiarising, whether from students currently doing the course, or from other sources. Students who knowingly allow other students to copy their work may also be penalised. If you have had help from someone else (other than a tutor), it is always safe to state the help that you got. For example, if you had help from someone else in writing a component of your code, it is not plagiarism as long as you state (eg, as a comment in the code) who helped you in writing the method.

Mandatory Requirements

The mandatory requirements for NWEN 406 are:

- You must achieve a minimum of a C grade on the project (the project may be resubmitted - but resubmissions will be worth at most a C).
- You must give both seminars and the project presentation.

Passing NWEN 406

To pass NWEN 406, a student must satisfy mandatory requirements and gain at least a **C** grade overall.

Withdrawal

The last date for withdrawal from NWEN 406 with entitlement to a refund of tuition fees is Fri 23 July 2010. The last date for withdrawal without being regarded as having failed the course is Fri 24 Sept 2010 -- though later withdrawals may be approved by the Dean in special circumstances.

Rules & Policies

Find key dates, explanations of grades and other useful information at <http://www.victoria.ac.nz/home/study>.

Find out about academic progress and restricted enrolment at <http://www.victoria.ac.nz/home/study/academic-progress>.

The University's statutes and policies are available at <http://www.victoria.ac.nz/home/about/policy>, except qualification statutes, which are available via the Calendar webpage at <http://www.victoria.ac.nz/home/study/calendar> (See Section C).

Further information about the University's academic processes can be found on the website of the Assistant Vice-Chancellor (Academic) at <http://www.victoria.ac.nz/home/about/avcacademic>

All students are expected to be familiar with the following regulations and policies, which are available from the school web site:

[Grievances](#)

[Student and Staff Conduct](#)

[Meeting the Needs of Students with Disabilities](#)

[Student Support](#)

[Academic Integrity and Plagiarism](#)

[Dates and Deadlines including Withdrawal dates](#)

[School Laboratory Hours and Rules](#)

[Printing Allocations](#)

[Expectations of Students in ECS courses](#)

The School of Engineering and Computer Science strives to anticipate all problems associated with its courses, laboratories and equipment. We hope you will find that your courses meet your expectations of a quality learning experience.

If you think we have overlooked something or would like to make a suggestion feel free to talk to your course organiser or lecturer.
