# Course Outline Public

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## Course Details

| | |
|---|---|
| **Course Code** | COMP6771 |
| **Course Title** | Advanced C++ Programming |
| **Convenor/Admin** | Hayden Smith (/users/z3418003) |
| **Lecturer(s)** | Hayden Smith (/users/z3418003) , Matt Stark (/users/z3470193) |
| **Contact for the course** | cs6771@cse.unsw.edu.au |
| **Classes** | Timetable for all classes (/COMP6771/19T2/timetable) |
| **Consultations** | Consultations for all classes (https://webcms3.cse.unsw.edu.au/COMP6771/19T2/timetable) |
| **Units of Credit** | 6 |
| **Course Website** | http://cse.unsw.edu.au/~cs6771/19T2/ (http://cse.unsw.edu.au/~cs6771/19T2/) |
| **Handbook Entry** | http://www.handbook.unsw.edu.au/undergraduate/courses/current/COMP6771.html (http://www.handbook.unsw.edu.au/undergraduate/courses/current/COMP6771.html) |

## Course Summary

COMP6771 is an advanced programming course teaching practical aspects of intermediate/advanced C++ programming. The course focuses on teaching the fundamentals of C++, followed by exploring powerful abstractions that C++ enables. This course focuses on using abstractions as well as building abstractions.

COMP6771 is focused on modern, practical programming methods and tools. This course is designed for latter year CSE students with a reasonable degree of programming competencies.

The course is heavily supported by Christopher Di Bella (https://www.cjdb.com.au/) , a UNSW CSE graduate who is a well regarded expert on C++. His knowledge and expertise assists in forming and updating the course.

Our aim for students who complete this course satisfactorily is that they are highly competent in understanding C++ and it's core features, being able to build complex programs, data structures, and algorithms with C++, and being ready to immediately move into the workforce in areas that rely heavily on C++.

COMP6771 can be a challenging course for students due to the volume of work to complete in a 10 week period.

# Assumed Knowledge

Before commencing this course, students should:

- Be competent in constructing and designing programs in the language C (from COMP1511/1917 or equivalent)
- Be competent in understanding object-oriented (OO) programming methods (from COMP2511/1531 or equivalent)

We will spend minimum time covering basics of C and OO such as pointers, pointer arithmetic, classes, objects, and memory.

# Student Learning Outcomes

After completing this course, students will:

1. Design, build, and test C++ programs
2. Use abstractions (data structures, algorithms) to solve problems efficiently
3. Build abstractions to solve problems efficiently
4. Distinguish good, modern, widely-used practices from more outdated pratices
5. Be confident setting up build and testing environments for C++ programs

This course contributes to the development of the following graduate capabilities:

| Graduate Capability | Acquired in |
|---|---|
| **Scholars** capable of independent and collaborative enquiry, rigorous in their analysis, critique and reflection, and able to innovate by applying their knowledge and skills to the solution of novel as well as routine problems | Assignment completion and feedback |
| **Entrepreneurial leaders** capable of initiating and embracing innovation and change, as well as engaging and enabling others to contribute to change | Using tutorial and lecture knowledge to complete eassignments |
| **Professionals** capable of ethical, self- directed practice and independent lifelong learning | Individual assignments completions |
| **Global citizens** who are culturally adept and capable of respecting diversity and acting in a socially just and responsible way | Participation in lectures and group work on assignment |

# Teaching Strategies

- Lectures: 3 hours of in-person/online delivered lectures, 1 hour of online delivered lectures per week.

- Tutorials: 1 hour of tutorial per week to go through examples of work covered in lectures.
    - There are no marks for tutorial attendance. Not attending tutorials will have no direct effect on your course marks. If you apply for special consideration, your tutorial attendance will have no impact on your special consideration request. However, choosing not to attend tutorials may have an impact on two things:
        - Your ability to learn - data consistently shows students who attend tutorials do better in the course
        - Generosity of tutors/lecturers. If you do not attend tutorials, tutors will be less likely to commit extra hours of help (e.g. via email) during exam period or for the assignments, as we view a lack of tutorial attendance is a lacking in a proactive learning attitude.
    - If you're unable to attend tutorials for legitimate reasons, please email your tutor and CC cs6771@cse.unsw.edu.au so that we are aware.
- Lab Work: This course does not contain any laboratory time. However, questions from tutorials, whether covered in class or not, can be studied in the student's own time.
- Assignments 3 assignments to allow for a deeper understanding of what is taught in the course.

# Teaching Rationale

Being a latter year CSE course, this course focuses on studying a topic (C++) in depth while assuming that students are mature and independent learners. Because of this a lot of time is focused on content delivery (4 hours of lectures + 1 hour of tutorial), with limited laboratory time. In this way, an expectation is placed on students that they are self-learners and can use the Webcms3 forum.

The course centres the teaching around 3 programming assignments, worth a total of 50% of the course assessment. We use these assignments to thoroughly put to practice what we teach you. This is a course where failure to make a satisfactory attempt at an assignment will make it difficult to complete further assignments (or the exam) to a high standard.

# Student Conduct

The **Student Code of Conduct** ( Information (https://student.unsw.edu.au/conduct) , Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf) ) sets out what the University expects from students as members of the UNSW community. As well as the learning, teaching and research environment, the University aims to provide an environment that enables students to achieve their full potential and to provide an experience consistent with the University's values and guiding principles. A condition of enrolment is that students *inform themselves* of the University's rules and policies affecting them, and conduct themselves accordingly.

In particular, students have the responsibility to observe standards of equity and respect in dealing with every member of the University community. This applies to all activities on UNSW premises and all external activities related to study and research. This includes behaviour in person as well as behaviour on social media, for example Facebook groups set up for the purpose of discussing UNSW courses or course work. Behaviour that is considered in breach of the Student Code Policy as discriminatory, sexually inappropriate, bullying, harassing, invading another's privacy or causing any person to fear for their personal safety is serious misconduct and can lead to severe penalties, including suspension or exclusion from UNSW.

If you have any concerns, you may raise them with your lecturer, or approach the School Ethics Officer (mailto:ethics-officer@cse.unsw.edu.au) , Grievance Officer (mailto:grievance-officer@cse.unsw.edu.au) , or one of the student representatives.

**Plagiarism** is defined as (https://student.unsw.edu.au/plagiarism) using the words or ideas of others and presenting them as your own. UNSW and CSE treat plagiarism as academic misconduct, which means that it carries penalties as severe as being excluded from further study at UNSW. There are several on-line sources to help you understand what plagiarism is and how it is dealt with at UNSW:

- Plagiarism and Academic Integrity (https://student.unsw.edu.au/plagiarism)
- UNSW Plagiarism Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

Make sure that you read and understand these. Ignorance is not accepted as an excuse for plagiarism. In particular, you are also responsible that your assignment files are not accessible by anyone but you by setting the correct permissions in your CSE directory and code repository, if using. Note also that plagiarism includes paying or asking another person to do a piece of work for you and then submitting it as your own work.

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW staff and students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.

If you haven't done so yet, please take the time to read the full text of

- UNSW's policy regarding academic honesty and plagiarism (https://student.unsw.edu.au/plagiarism)

The pages below describe the policies and procedures in more detail:

- Student Code Policy (https://www.gs.unsw.edu.au/policy/documents/studentcodepolicy.pdf)
- Student Misconduct Procedure (https://www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf)
- Plagiarism Policy Statement (https://www.gs.unsw.edu.au/policy/documents/plagiarismpolicy.pdf)
- Plagiarism Procedure (https://www.gs.unsw.edu.au/policy/documents/plagiarismprocedure.pdf)

You should also read the following page which describes your rights and responsibilities in the CSE context:

- Essential Advice for CSE Students (https://www.engineering.unsw.edu.au/computer-science-engineering/about-us/organisational-structure/student-services/policies/essential-advice-for-cse-students)

# Assessment

| Item | Topics | Completion type | Due | Marks | Contributes to |
|---|---|---|---|---|---|
| Assignment 1 | C++ Basics, STL | **Individual** | End of week 3 | 15% | |
| Assignment 2 | Operator Overloading, Iterators, OO | **Individual** | End of week 6 | 15% | |
| Assignment 3 | Iterators, Exceptions, Templates, OO | **Group (pairs)** | End of week 9 | 20% | |
| Final Exam (Hurdle) | All topics | **Individual** | Exam Period | 50% | |

The hurdle requirement for the final exam will be something in the ballpark of 25%. The exact figure will depend on the complexity of the exam - as harder exams would have a lower hurdle, and easier exams would have a higher hurdle. Because this is the first time the course has run in 2 years and the first time it has run during a trimester, it's important we see how things in the first weeks pan out before making finalised decisions on the exam.

# Course Schedule

| Week | Lectures | Tutes | Assignments |
|---|---|---|---|

| | | | |
|---|---|---|---|
| 1 | Course intro, Getting started | On lecture content | - |
| 2 | C++ Basics, STL, Testing | On lecture content | - |
| 3 | Basic Object-Oriented Programming | On lecture content | Ass1 due |
| 4 | Operator Overloading | On lecture content | - |
| 5 | Exceptions | On lecture content | - |
| 6 | Iterators | On lecture content | Ass2 due |
| 7 | Templates, Part 1 | On lecture content | - |
| 8 | Advanced Object-Oriented Programming | On lecture content | - |
| 9 | Templates, Part 2 | On lecture content | Ass3 due |
| 10 | Extension Topics, Exams | Revision | - |

# Resources for Students

There is no definitive textbook list for this course. Students are able to complete this course without the use of an explicit resource, however, students are encouraged to seek out resources we recommend if they feel they need the help.

If we had to point you to a single resource, it would be:

- *Programming: Principles and Practice Using C++* (https://rads.stackoverflow.com/amzn/click/com/0321992784) (Bjarne Stroustrup, 2nd Edition - May 25, 2014) ( **updated for C++11/C++14** ) An introduction to programming using C++ by the creator of the language. A good read, that assumes no previous programming experience, but is not only for beginners.

For a more detailed list of resources, you can explore this Stack Overflow (https://stackoverflow.com/questions/388242/the-definitive-c-book-guide-and-list) article. Some of these resources may be better than others, and we do not endorse a particular one.

# Special Consideration

If your work in this course is affected by unforeseen adverse circumstances, you should apply for Special Consideration. If your request is reasonable and your work has clearly been impacted, then

- for an assignment, you may be granted an extension
- for the Final Exam, you may be offered a Supplementary Exam

Note the use of the word "may". None of the above is guaranteed. It depends on you making a convincing case that the circumstances have clearly impacted your ability to work.

UNSW handles special consideration requests centrally (in the Student Lifecycle division), so all special consideration requests must be submitted via the UNSW Special Consideration (https://iaro.online.unsw.edu.au/special_consideration/home.login) website.

Special consideration requests must be accompanied by documentation, which will be verified by Student Lifecycle. Do not email the course convenor directly about special consideration.

Extensions on assignments will only be awarded if the majority of the team are affected.

If you cannot attend the Final Exam because of illness or misadventure, then you must submit a Special Consideration request, with documentation, through MyUNSW within 24 hours of the exam. If your request is reasonable, then you will be awarded a Supplementary Exam (aka "Supp").

Note that UNSW expects you to be available to sit Supplementary Exams (held in the week Sep 9-13) if required. If you are awarded a Supp and do not attend, then your exam mark will be zero.

For further details on special consideration, see the UNSW Student website (https://student.unsw.edu.au/special-consideration) .

If you are registered with Disability Services, please forward your documentation to Hayden Smith (mailto:mailto:hsmith@cse.unsw.edu.au) within the first two weeks of semester.

# Course Evaluation and Development

This course is evaluated each session using the myExperience system.

In the previous offering of this courses, students noted the following concerns or requested improvements:

- Reducing the number of assignments, and more fairly valuing their weightings
- Releasing more code examples with lectures and tutorials
- Exploring the possibilities of groupwork
- More labs and less lecture time

Based on their comments, we have:

- Made the 3rd assignment one that is completed in a pair
- Prepared more code examples with lectures and tutorials
- Reduced the number of assignments to 3, and increased the overall assignment weighting to 50%

Based on their comments, we have not:

- Added more labs and less lecture time. This is a higher year computing course for an advanced topic. Such courses are designed to be challenging and for more capable and independent students. Therefore more time is focused on explaining topics (lectures) and more faith is put in the students to undertake and reinforce their learnings in their own time.

Resource created 11 months ago (Thursday 16 May 2019, 07:29:22 PM), last modified 10 months ago (Wednesday 19 June 2019, 10:27:59 AM).

## Comments

(/COMP6771/19T2/forums/search?forum_choice=resource/26804)

(/COMP6771/19T2/forums/resource/26804)



Kevin Yu (/users/z5117900) 11 months ago (Mon Jun 10 2019 23:24:07 GMT+1000 (Australian Eastern Standard Time))

What will the lab environment for testing in the final exam look like? Will there be an IDE (i.e. CLion + Bazel) or the usual give cli?

Edit Delete



Brendan Coughlan (/users/z3470053) 11 months ago (Thu Jun 06 2019 18:50:06 GMT+1000 (Australian Eastern Standard Time))

Request for Assignment release date to be added to the course schedule. Currently i'm planning my semester an this information would be very helpful.

Edit Delete



Paul Walters (/users/z5077446) 11 months ago (Thu Jun 06 2019 16:13:07 GMT+1000 (Australian Eastern Standard Time))

Hello, considering that the Assignment 1 deadline is supposed to be the end of Week 3, is it possible to have Assignment 1 released this week? This means that I and presumably everyone else can start looking at it and planning as much time as possible for it.

If it is then I would be most grateful.

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Burny Lu (/users/z5116054) 11 months ago (Thu Jun 06 2019 18:42:23 GMT+1000 (Australian Eastern Standard Time))

Hayden mentioned that it was going to be released today

Edit Delete



Haibo Wang (/users/z5135009) 11 months ago (Thu May 23 2019 13:42:08 GMT+1000 (Australian Eastern Standard Time))

hi there,

can we team up with someone outside our tut for assignment 3?

Edit Delete



Hayden Smith (/users/z3418003) 11 months ago (Sun May 26 2019 17:18:08 GMT+1000 (Australian Eastern Standard Time))

Yes

Edit Delete



Hayden Smith (/users/z3418003) 11 months ago (Thu May 23 2019 17:39:00 GMT+1000 (Australian Eastern Standard Time))

I'll get back to you

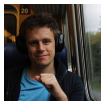
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Kevin Huang (/users/z3461590) 11 months ago (Thu May 23 2019 17:47:46 GMT+1000 (Australian Eastern Standard Time))

While we are at it can you confirm if we can solo?

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Hayden Smith (/users/z3418003) 11 months ago (Thu May 23 2019 18:02:36 GMT+1000 (Australian Eastern Standard Time))

Yes, pending approval by your tutor and myself closer to the date (based on good reasoning)

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Aniket Sharma (/users/z5126009) 11 months ago (Tue May 21 2019 01:29:43 GMT+1000 (Australian Eastern Standard Time)), last modified 11 months ago (Tue May 21 2019 01:30:33 GMT+1000 (Australian Eastern Standard Time))

What is the final exam hurdle requirement? I.e. >40%, >50%? required in exam to pass the subject

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Hayden Smith (/users/z3418003) 11 months ago (Thu May 23 2019 17:37:34 GMT+1000 (Australian Eastern Standard Time))

It depends on the complexity of the exam and the nature of the questions - which will be governed a bit by how students are going in the course. The general accepted rule is that it's about 25% but again, meaningless number as if the exam is in general easier this will be higher.

tl;dr TBD

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Omar Ghattas (/users/z5121260) 11 months ago (Tue May 21 2019 00:43:43 GMT+1000 (Australian Eastern Standard Time))

will the final exam be paper based or lab based?

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Hayden Smith (/users/z3418003) 11 months ago (Thu May 23 2019 17:36:55 GMT+1000 (Australian Eastern Standard Time))

Lab based

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