



**Nanchang University**  
**CS21: Intermediate Programming**  
(Last Updated in Jan. 2024)

**Credit: 6**

***Contact Hours***

This course is composed of 24 lecture sessions, 3 tutorial sessions and 9 office contact hours. Each lecture session takes 2 contact hours in length; each tutorial session takes 3 contact hours in length; There will be a Q-A review session (3 contact hours) and Final Exam (3 contact hours) at the end of this term. This course has 72 contact hours in total.

***Course Description***

C++ is a large, complex language, and learning it is never entirely easy. But some concepts and techniques must be thoroughly mastered if students are ever to do professional-quality work. This course aims at cutting through the technical details to reveal what is commonly understood to be absolutely essential. It includes the most critical knowledge required for successful C++ programming. During your learning, you will find that this course covers essential but commonly misunderstood topics in C++ programming and design while filtering out needless complexity in the discussion of each topic. All of it remains is a clear distillation of the essential required for production C++ programming, presented in the author's trademark incisive, engaging style.

*Note: This Syllabus is subject to change based on the needs of the class.*

***Required Textbook***

*C++ Common Knowledge: Essential Intermediate Programming* by Stephen C. Dewhurst  
Publisher: Addison-Wesley Professional; 1(March 10, 2005)

***Grading***

•Participation	10%
•Quizzes	20%
•Reports	20%
•Midterm Exam	20%
•Final Exam	30%



Letter Grade	Grade Points
High Distinction	85-100
Distinction	75-84
Credit	65-74
Pass	50-64
Fail	0-49

### ***Course Schedule***

The course has 24 class sessions in total. All sessions are 2 contact hours in length. At the end of this term, there will be a Q-A review session (3 contact hours) and Final Exam (3 contact hours).

Note: the course outline and required readings are subject to change.

Class 1:

Introduction to the course and the textbook

Class 2:

Data Abstraction

Polymorphism

Design Patterns

Class 3:

The Standard Template Library

References Are Aliases, Not Pointers

Array Formal Arguments

Class 4:

Const Pointers and Pointers to Const

Pointers to Pointers

New Cast Operators

Report 1

Class 5:

Meaning of a Const Member Function

The Compiler Puts Stuff in Classes

Assignment and Initialization Are Different

Class 6:

Copy Operations

Function Pointers



## Pointers to Class Members Are Not Pointers

### Class 7:

Pointers to Member Functions Are Not Pointers

Dealing with Function and Array Declarators

Function Objects

### Class 8:

Commands and Hollywood

STL Function Objects

Overloading and Overriding Are Different

Quiz 1

### Class 9:

Template Method

Namespaces

Member Function Lookup

### Class 10:

Argument Dependent Lookup

Operator Function Lookup

Capability Queries

### Class 11:

Meaning of Pointer Comparison

Virtual Constructors and Prototype

Factory Method

### Class 12:

Midterm Exam

### Class 13:

Covariant Return Types

Preventing Copying

Manufacturing Abstract Bases

### Class 14:

Restricting Heap Allocation

Placement New

Class-Specific Memory Management

### Class 15:

Array Allocation

Exception Safety Axioms

Exception Safe Functions



Class 16:

RAII

New, Constructors, and Exception

Smart Pointers

Report 2

Class 17:

Auto\_ptr Is Unusual

Pointer Arithmetic

Template Partial Specialization

Class 18:

Class Template Explicit Specialization

Template Partial Specialization

Class Template Member Specialization

Class 19:

Disambiguating with Typename

Member Template

Disambiguating with Template

Class 20:

Specialization for Type Information

Embedded Type Information

Traits

Quiz 2

Class 21:

Template Template Parameters

Policies

Template Argument Deduction

Class 22:

Overloading Function Templates

SFINAE

Generic Algorithms

Class 23:

You Instantiate What You Use

Class 24:

Include Guards

Optional Keywords



## ***Attending Policy***

Regular and prompt attendance is required. Under ordinary circumstances, you may miss two times without penalty. Each absence over this number will lower your course grade by a third of a letter and missing more than five classes may lead to a failing grade in the course. Arriving late and/or leaving before the end of the class period are equivalent to absences.

## ***Policy on “Late Withdrawals”***

In accordance with university policy, appeals for late withdrawal will be approved **ONLY** in case of medical emergency and similar crises.

## ***Academic Honesty***

Nanchang University expects all students to do their own work. Instructors will fail assignments that show evidence of plagiarism or other forms of cheating, and will also report the student's name to the University administration. A student reported to the University for cheating is placed on disciplinary probation; a student reported twice is suspended or expelled.

## ***General Expectations:***

Students are expected to:

- Attend all classes and be responsible for all materials covered in class and otherwise assigned;
- Complete the day's required reading and assignments before class;
- Review the previous day's notes before class and make notes about questions you have about the previous class or the day's reading;
- Participate in class discussions and complete required written work on time;
- Refrain from texting, phoning or engaging in computer activities unrelated to class during the class period;
- While class participation is welcome, even required, you are expected to refrain from private conversations during the class period.

## ***Special Needs or Assistance***

Please contact the Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material. Our goal is to help you learn, not to penalize you for issues which mask your learning.