

Information on the NYU Computer Science Placement Exam for Freshmen
For students who wish to place OUT of V22.0002, INTO V22.0101
<http://cs.nyu.edu/csweb/Academic/Undergrad/freshmen.pdf>

Well prepared freshmen who want to major in Computer Science and who have some programming experience, either from high school or the workplace, are advised to take V22.0101 and V22.0102 in their freshman year. This will allow more flexibility in taking electives during the junior and senior year. All sections of these classes use the Java programming language. Knowledge of Java is *not* required to enter V22.0101. The language will be taught from the beginning. However, in order to place into V22.0101, you must have some experience with a standard programming language, usually C, C++, or Pascal. If you already know Java well, make an appointment with the Director of Undergraduate Studies to discuss your options.

The Placement Exam for Freshmen will test your basic knowledge of C/C++ or Pascal. Do not take the placement exam if you are not prepared for it. There are two different versions of the exam: one in C/C++, and one in Pascal. Make sure you take the right version. You need a clear knowledge of simple C or Pascal syntax. For the C/C++ exam, you do **not** need to know the features of C++ which are an extension of C, with the exception of the use of `cin` and `cout` for simple input and output. If you know some other programming language you must learn some C or Pascal on your own to prepare for the placement exam.

If you pass the placement exam, you may register for V22.0101. If you receive a sufficiently high grade, you may register for the *honors* section of V22.0101.

If you have little or no programming experience, you should take V22.0002 (introduction to programming using C) either the summer before your freshman year, or during your freshman fall or spring semester, before taking V22.0101 (which is offered only in the fall). If you receive a grade of B or higher in V22.0002, you may register for V22.0101. If your grade in V22.0002 is lower than B, you should find a different major.

If you have an outstanding academic record or documented programming experience, you may be able to place into V22.0101 (honors if appropriate) without taking the placement exam, by providing appropriate documentation to the department.

In order to receive advance placement credit for V22.0101 or V22.0102, you must receive a grade of at least 4 on the AP Exam in Computer Science, administered by the Educational Testing Service. A grade of 5 gives honors credit. The AP exam uses C++, not Java. If you receive a 4 or a 5 on the AB version of the AP test, you may place out of V22.0101 and V22.0102, but you will be expected to *learn Java on your own*, as it will be required for other courses in the curriculum. If you receive a 4 or a 5 on the A version of the AP test, you have the right to place out of V22.0101, but you must learn Java on your own before taking V22.0102; you may prefer to take V22.0101 instead of placing out of it, so that you will have a solid knowledge of Java on entering V22.0102.

If you take the AP Exam, do not take the placement exam. We can use your AP grade to place you. A grade of 3 automatically places you into V22.0101.

For further information, send email to csungrad@cs.nyu.edu.

See next page for more information

Topics Covered by the C/C++ Placement Exam

The C/C++ version of the placement exam covers the following topics

- Variables: types `int` and `float`
- The arithmetic operators `+`, `-`, `*`, `/`
- The relational operators `<`, `<=`, `>`, `>=` and `==`
- The boolean operators `&&` and `||`
- Assignment statements and increment operators (e.g. `x++`)
- The if-else statements, including nested if-else statements
- The for loop, including nested for loops
- Standard C++ input and output using `cin` and `cout`, as illustrated by the following program which reads two integers from the input and prints them to the output. Notice the use of `endl` to end the line that is output.

```
main()
{
    int number1, number2;
    cin >> number1 >> number2;    /* read two numbers */
    cout << "The first number that was input was " << number1 << endl;
    cout << "The second number that was input was " << number2 << endl;
}
```

The C/C++ version of the placement exam does **NOT** cover

- Types `char`, `double`, `short`, `long`
- The “not” operator `!` and the bitwise operators
- Functions, classes and objects
- Arrays and strings
- Pointers
- The while, do and switch statements
- The standard C input and output statements `scanf` and `printf`
- Shorthand assignment (e.g. `x *= 10`)

Reference: any book on C programming. If you use a book on C++ programming, make sure you are studying the basic C syntax, not the C++ extensions. For `cin` and `cout`, which are not part of standard C, all you need to know is illustrated in the example above.

See next page for sample questions

Two Sample Questions for the C Placement Exam

1. Fill in the spaces marked with ____ to complete the following Boolean expressions. Do *not* use the Boolean operator “!” in your answer. Write *only* in the spaces marked with _____. Assume that X, Y and Z are integer variables.

- An expression that is true if X *is strictly the largest* of the three variables X, Y and Z. For example, if X is 50, Y is 40 and Z is 45, the expression should be true, but if X is 50, Y is 40, and Z is 50, the expression should be false, since X is not strictly greater than Z.

(_____) ____ (_____)

- An expression that is true if X is *one of the largest* of the three variables X, Y and Z. For example, if X is 50, Y is 40 and Z is 50, the expression should be true.

(_____) ____ (_____)

2. Consider the following program:

```
main()
{
    int n, k, max;

    cin >> max;          /* read value for max */
    for (n = 0; n < max; n++)
    { for (k = 0; k < max; k++)
      { if (n > k)
        cout << " G ";
        else if (n < k)
          cout << " L ";
        else
          cout << " E ";
      }
      cout << endl;
    }
}
```

Show the output of the program if

- the value input for `max` is 5
- the value input for `max` is 1
- the value input for `max` is 0

See Next Page for Information on Pascal Placement Exam

Topics Covered by the Pascal Placement Exam

The Pascal version of the placement exam covers the following topics

- Variables: types integer and real
- Arithmetic and Boolean operators and expressions
- The assignment statement
- The if-then-else statement, including nested if-then-else statements
- The for loop, including nested for loops
- Input and output using read, write, and writeln (not readln)

The Pascal version of the placement exam does **NOT** cover

- Characters and strings
- Procedures and functions
- Arrays
- Pointers
- The while, repeat and case statements.

Reference: any book on Pascal programming e.g. *Turbo Pascal*, Samuel Marateck, Wiley, Chapters 3, 4, 5, and 7 (except the “case” statement).

See next page for sample questions

Two Sample Questions for the Pascal Placement Exam

1. Fill in the spaces marked with ____ to complete the following Boolean expressions. Do *not* use the Boolean operator “not” or the function “ord” in your answer. Write *only* in the spaces marked with _____. Assume that X, Y and Z are integer variables.

- An expression that is true if X *is strictly the largest* of the three variables X, Y and Z. For example, if X is 50, Y is 40 and Z is 45, the expression should be true, but if X is 50, Y is 40, and Z is 50, the expression should be false, since X is not strictly greater than Z.

(_____) ____ (_____)

- An expression that is true if X is *one of the largest* of the three variables X, Y and Z. For example, if X is 50, Y is 40 and Z is 50, the expression should be true.

(_____) ____ (_____)

2. Consider the following program:

```
program numbers;
var N, K, MAX: integer;
begin
  read(MAX);
  for N := 1 to MAX do
    begin
      for K := 1 to MAX do
        if N > K then
          write(' G ')
        else if N < K then
          write(' L ')
        else
          write(' E ');
      writeln
    end
  end.
```

Show the output of the program if

- the value input for MAX is 5
- the value input for MAX is 1
- the value input for MAX is 0