

# Introduction to C programming

- C is fast
  - Low-level programming language
- In C we need to:
  - Declare and initialize our variables (including type)
  - Explicitly print the results
  - Compile our code
- Your program is run from the terminal

# Hello world

- Example code: startup1.c

```
#include <stdio.h>
```

← Library

```
main()
```

```
{
```

```
    printf("Hello, world!\n");
```

```
    return 0;
```

```
}
```

```
~
```

↘ Returns 0 if code is correctly executed

# Compile the code

- Gnu Compiler Collection (gcc)

```
gcc hello.c -o hello -lm
```

Your C code                      Output file name                      Include math library

- Run the code

```
./hello
```

# Variables

```
/*Program for doing something */
#include <math.h>
#include <stdio.h>
#include <stdlib.h>
#include <time.h>

main()
{
    int a=2,b=3; //Declare and initiate
    int n=pow(10,3); //Declare and initiate
    double x; //Declare
    double f=0; //Declare and initiate
    int i; //Counter of the loop has to be initiated
    for(i=0; i<n; i++)
    {
        x=(a*i)/b; //do something
        f+=x; //add to f
    }

    printf("The value of f is %f \n",f);
    return 0;
}
```

Types: char, int, float, double

# Printing results

```
printf("The value of f is %f \n", f);
```

Variable name

What will be printed

New line

Floating point  
number

%s	string
%d	integer
%f	float
%E	floating in scientific notation

# Generating random numbers

```
/*Generate n random numbers and print to stdout*/
#include <math.h>
#include <stdio.h>
#include <stdlib.h>

int main()
{
    int n=10, i;
    double x;
    int myseed;

    myseed=125365454; //own seed
    srand48(myseed); //Make a new seed for the random number generator
    for(i=0; i<n; i++)
    {
        x=drand48(); //generate a random number
        printf("Random number %i: %f\n",i,x); //print random number
    }
    return 0;
}
```

The *drand48()* and *erand48()* functions return non-negative, double-precision, floating-point values, uniformly distributed over the interval [0.0 , 1.0].

# Output

Random number 0: 0.940938

Random number 1: 0.183880

Random number 2: 0.298904

Random number 3: 0.699814

Random number 4: 0.162401

Random number 5: 0.722669

Random number 6: 0.352047

Random number 7: 0.608764

Random number 8: 0.358690

Random number 9: 0.389977

# Set a new seed before the loop

```
/*Generate n random numbers and print to stdout*/
#include <math.h>
#include <stdio.h>
#include <stdlib.h>

int main()
{
    int n=10, i;
    double x;
    int myseed;

    myseed=time(NULL); //new seed each time
    srand48(myseed); //Make a new seed for the random number generator
    for(i=0; i<n; i++)
    {
        x=drand48(); //generate a random number
        printf("Random number %i: %f\n",i,x); //print random number
    }
    return 0;
}
```