



## Teaching an introductory programming course with *R*

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[www.uibk.ac.at/disc](http://www.uibk.ac.at/disc)

# DiSC: Digital Science Center



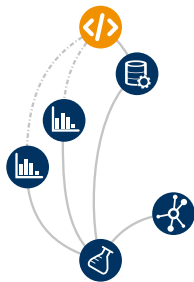
- Part of the digitalization initiative at the Universität Innsbruck
- Interdisciplinary synergies between computer science, mathematics, statistics and other scientific disciplines

# Teaching @ DiSC

## Introduction to programming

- First course in DiSC minor
- For programming novices
- Alternatively: Either Python or R
- Focus on data types, classes, control flow, etc.
- Data analysis later

## Minor Digital Science



Introduction to programming

Data management

Data analysis I

Data analysis II

Aspects of digitalization

Data analysis lab

# Content

## Core infrastructure and program flow

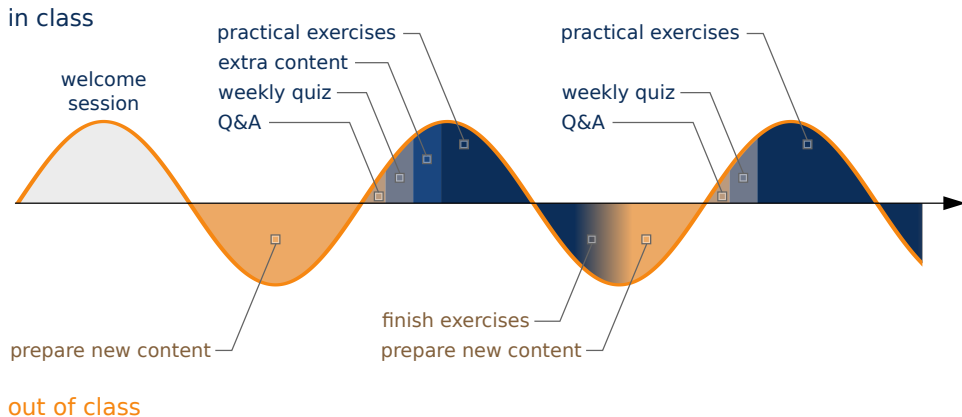
- Installation, IDE
- Vectors
- Matrices
- Functions & testing
- Conditional execution
- Loops
- Preparation session
- Mid-term examination

## Data structures and management

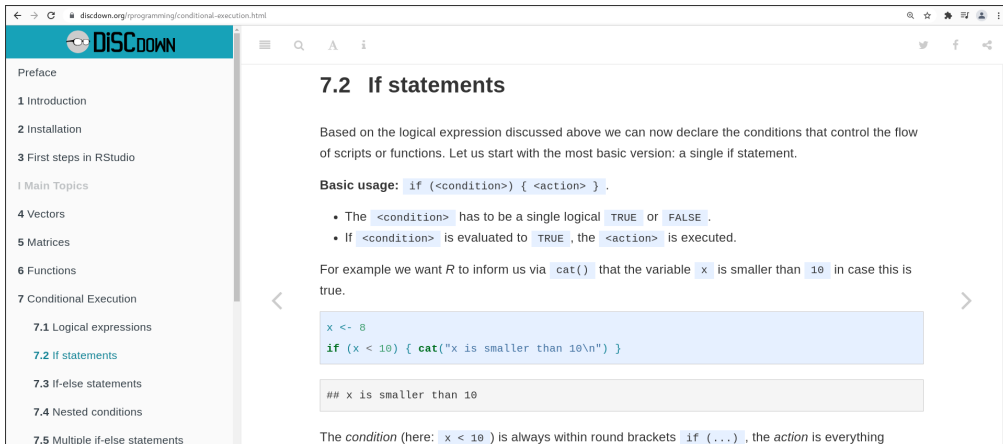
- Lists & data frames
- Data classes & methods
- Reading and writing
- Data management
- Preparation session
- Final examination
- Closing session

# Course flow

## Flipped classroom design



Freely available on <https://discdown.org/rprogramming>



The screenshot shows a web browser displaying the DiscDown website. The left sidebar contains a navigation menu with the following items: Preface, 1 Introduction, 2 Installation, 3 First steps in RStudio, I Main Topics, 4 Vectors, 5 Matrices, 6 Functions, 7 Conditional Execution, 7.1 Logical expressions, 7.2 If statements (highlighted in blue), 7.3 If-else statements, 7.4 Nested conditions, and 7.5 Multiple if-else statements. The main content area is titled '7.2 If statements' and contains the following text: 'Based on the logical expression discussed above we can now declare the conditions that control the flow of scripts or functions. Let us start with the most basic version: a single if statement.' Below this, the 'Basic usage:' is defined as `if (<condition>) { <action> } .`. A bulleted list follows: '• The <condition> has to be a single logical TRUE or FALSE .', '• If <condition> is evaluated to TRUE , the <action> is executed.' An example is provided: 'For example we want R to inform us via cat() that the variable x is smaller than 10 in case this is true.' Below the text, a code block shows: 

```
x <- 8
if (x < 10) { cat("x is smaller than 10\n") }
```

 This is followed by a light gray box containing the output: 

```
## x is smaller than 10
```

 At the bottom, a note states: 'The condition (here: x < 10 ) is always within round brackets if (...) , the action is everything'.

# Technologies



**bookdown**  
for the book



**R/exams**  
for online quizzes and cloze questions  
with file upload for examination

```
----- FAILED[logo]:  
call| get logo()  
diff| No logo found.
```

**tinytest**  
for self assessment during exercises and exams

# Thank you for your interest!

```
(inherits(family, "foehnix.family")) {  
  if ( verbose ) cat("foehnix.family object probided: use custom family object.\n")  
} else if ( inherits(family, "character") ) {  
  family <- match.arg(family, c("gaussian", "logistic"))  
  if ( ! all(is.infinite(c(left, right))) ) {  
    # Take censored version of "family" using the censoring  
    # thresholds left and right.  
    if ( ! truncated ) {  
      family <- get(sprintf("foehnix_c%s", family))(left = left, right = right)  
      # Else take the truncated version of the "family".  
    } else {  
      family <- get(sprintf("foehnix_t%s", family))(left = left, right = right)  
    }  
  }  
}
```



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