

# Dissecting the secrets of software testing education in universities

## 01 Introduction

Software testing plays a crucial role in building functioning, robust and reliable software.

A survey conducted by JetBrains shows us that software testing is increasingly becoming an integral part [1].

Augusto et al concluded that acquiring software testing knowledge results in producing twice as likely reliable code [2].

## 02 Research Questions

### Main Question:

- What major software testing topics are being discussed in syllabi of software engineering and software testing courses at university level?

### Sub Questions:

- What are the course contents of software testing and software engineering courses?
- What are the learning objectives of software testing and software engineering courses?
- What are the course activities of software testing and software engineering courses?
- How do course contents compare in different continents?

## 07 References

[1] JetBrains survey testing 2022. available: <https://www.jetbrains.com/lp/devecosystem-2022/testing/>.

[2] Otavio Augusto Lazzarini Lemos, Fabio Fagundes Silveira, Fabiano Cutigi Ferrari, and Alessandro Garcia. The impact of software testing education on code reliability: An empirical assessment. Journal of Systems and Software, 137:497–511, 2018.

[3] Qs world university rankings by subject 2023: Computer science and information systems. available: <https://www.topuniversities.com/university-rankings/university-subject-rankings/2023/computer-science-information-systems>.

[4] Baris Ardic and Andy Zaidman. Hey teachers, teach those kids some software testing. Proceedings of the Fifth ICSE Workshop on Software Engineering Education for the Next Generation (ICSE SEENG), pages 9–16, 2023.

## 05 Results

Occurrences of software testing topics

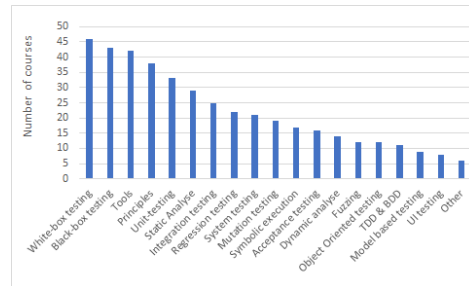


Figure 1: Overview of course contents in software testing courses.

Occurrences of software testing topics

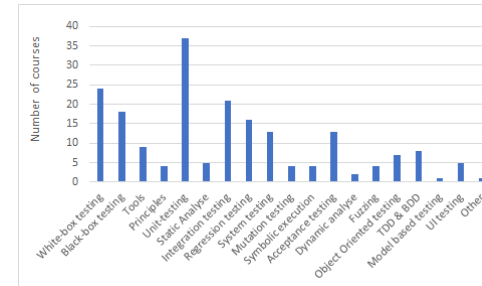


Figure 2: Overview of course contents in software engineering courses.

Comparison of course contents

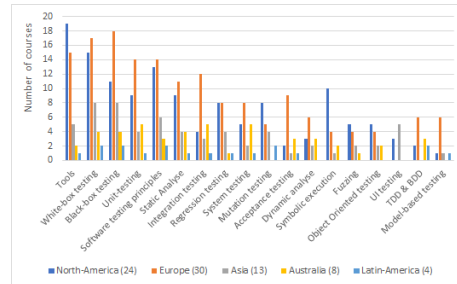


Figure 3: Overview of course contents in software testing courses in each continent.

Comparison of course contents

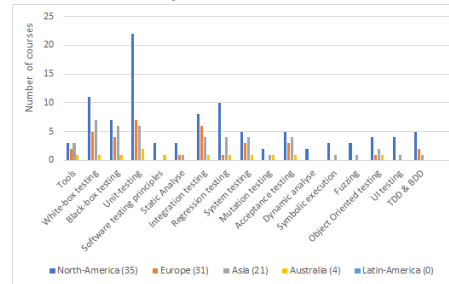


Figure 4: Overview of course contents in software engineering courses in each continent.

Occurrences of course activities

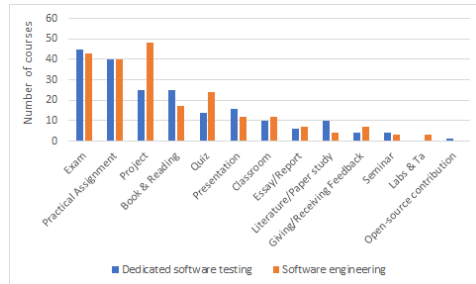


Figure 5: Overview of course activities

## 03 Methodology

1. Extract top-150 universities based on QS ranking for Computer Science and Engineering [3].
2. For each university find software testing and engineering courses by searching through the course catalogue and by using the THE100 list [4].
3. Extract and label course content, course goal, assessment and course activities from the syllabus of the courses.
4. Search through potential additional information like course website, Github links for concerned courses, slides and professor's pages. Label the information from these sources.

## 04 Dataset

- Europe: 61 courses
- North America 59 courses
- Asia: 34 courses
- Australia: 12 courses
- Latin America: 4 courses
- Africa: 0 courses
- Software testing: 79
- Software engineering: 91

## 06 Conclusion

- White-box testing, black-box testing and tools are the most taught topics in software testing courses.
- Unit testing, white-box testing, integration testing and black-box testing are the most taught topics in software engineering courses.
- Both courses provide practical experience through projects or practical assignments.
- Practical experience, test techniques and tools and frameworks are the most common learning objectives in software testing courses.
- Software testing is the most common learning objective in software engineering courses, excluding software engineering and development.

### Most common learning activities software testing

- Practical experience (36)
- Testing techniques (26)
- Tools and frameworks (25)
- Fundamentals of software testing techniques (23)

### Most common learning activities software engineering

- Software engineering & development (60)
- Software testing (44)
- Software architecture & design (42)
- Software management & maintenance (30)