# Introduction to the LEI-ESOFT Course Unit

2024 – 2025

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# ESOFT – General Goals

- Provide the initial and core knowledge, capabilities and competencies of Software Engineering, especially in the scope of Information Systems.

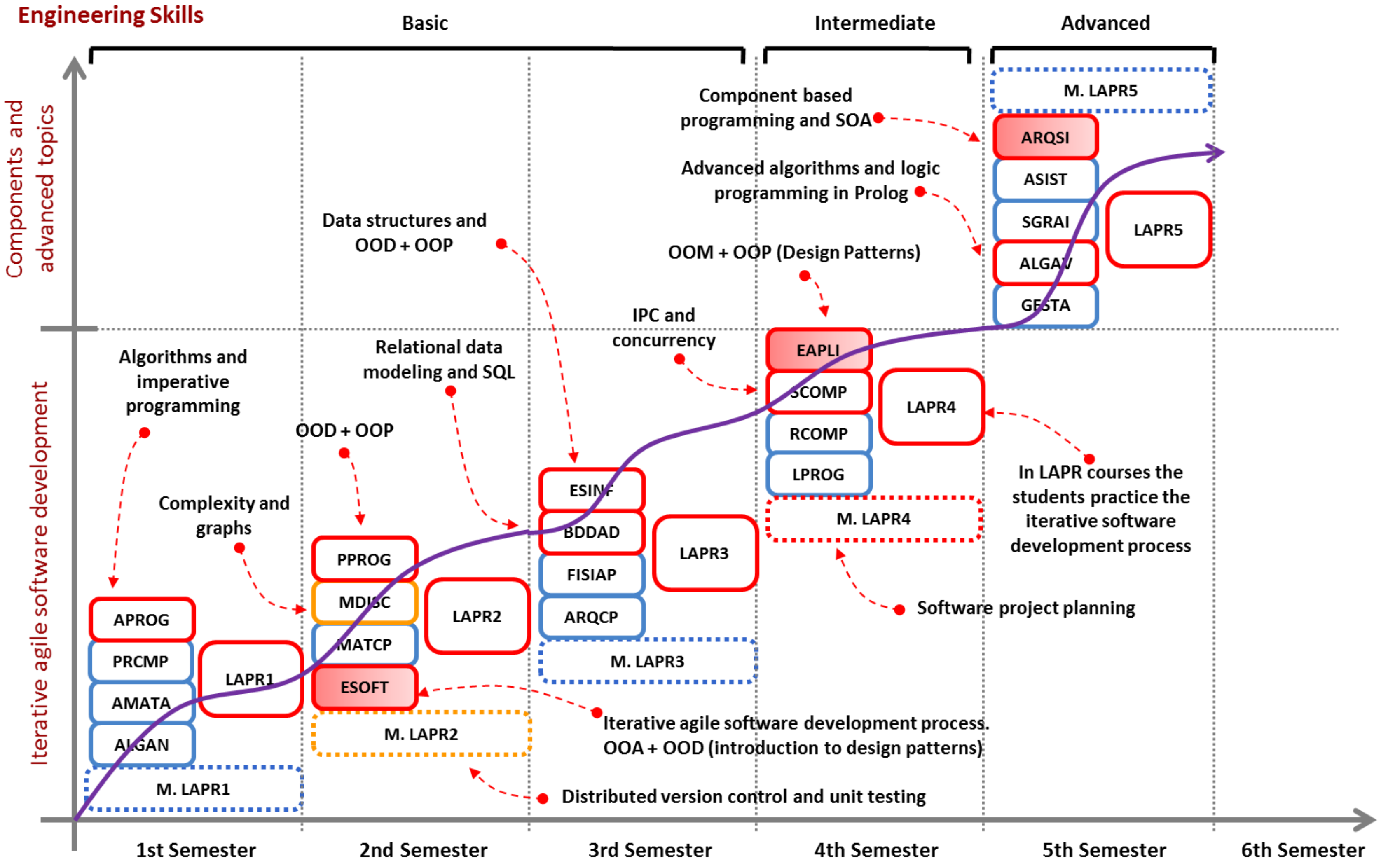
- Promote the adoption of an Iterative and Incremental (I&I) Software Development Process (SDP), regarding:
    - Requirements Engineering
    - Object-Oriented (OO) Software Analysis
    - OO Software Design
    - Coding of the proposed design

# ESOFT – Specific Goals

At the end of the course unit, the student must be able to:

1. **Apply** an I&I SDP, in a deterministic way
2. Apply **requirements** engineering and **analysis** methods enhancing the understanding and specification of the application domain
3. Apply and justify the adoption of software **design** methods, principles, patterns and architectures
4. **Build** a prototype of the system in accordance with the design, using the Java language

# Course unit (ESOFT) vs. Program scope (LEI)



Engineering Skills
Basic
Intermediate
Advanced
Components and advanced topics
Iterative agile software development
Component based programming and SOA
Advanced algorithms and logic programming in Prolog
OOM + OOP (Design Patterns)
Data structures and OOD + OOP
IPC and concurrency
Algorithms and imperative programming
Relational data modeling and SQL
OOD + OOP
Complexity and graphs
In LAPR courses the students practice the iterative software development process
Software project planning
Iterative agile software development process. OOA + OOD (introduction to design patterns)
Distributed version control and unit testing
M. LAPR5
ARQSI
ASIST
SGRAI
ALGAV
GESTA
LAPR5
EAPLI
SCOMP
RCOMP
LPROG
LAPR4
M. LAPR4
ESINF
BDDAD
FISIAP
ARQCP
LAPR3
M. LAPR3
PPROG
MDISC
MATCP
ESOFT
LAPR2
M. LAPR2
APROG
PRCMP
AMATA
ALGAN
LAPR1
M. LAPR1
1st Semester
2nd Semester
3rd Semester
4th Semester
5th Semester
6th Semester

# Software Engineering in the 2nd semester

| Knowledge item / Course unit | ESOFT | PPROG | LAPR2 |
|---|---|---|---|
| Development Process | X | | \ |
| Requirements | X | | X |
| Analysis | X | | |
| Design | X | \ | |
| Implementation | \ | X | |
| Testing | | X | |
| Deployment | | | X |
| Object Oriented Paradigm | X | X | |
| Java | | X | |
| Teamwork | \ | \ | X |
| Communication | X | | X |

**X** – Extensively addressed
**\** – Partially addressed

# Pedagogical Approach

- Iterative and Incremental (I&I)
  - 3 Sprints → 3 Deliveries/Submissions in Moodle at the end of each sprint
  - Assessment and Feedback with regularity
    - **How:** Mandatory and individual presentation/defense
    - **When:** During the following sprint
    - **Where**: In lab classes (and if necessary, also out of classes)
- Project – Practical teamwork
  - Groups from the same lab class
  - Goals
    - Formative
    - Evaluative
  - To be developed
    - In lab classes
    - **Outside of classes**

# Semester Overview

| Iteration | Week | Starting | Ending | Project Goals | Lab/Autonomous Work |
|---|---|---|---|---|---|
| | 1 | 24/02/2025 | 28/02/2025 | n/a | 1. Introduction to Object-Oriented Programming |
| | 2 | 03/03/2025 | 07/03/2025 | | |
| **Sprint 1** | 3 | 10/03/2025 | 14/03/2025 | *(Launch of Project Statement)*<br>Focus on Requirements Elicitation/Specification and Analysis | 1. Setting up and getting used to required tools<br>2. Studying the introduced topics<br>3. Development of Sprint 1 |
| | 4 | 17/03/2025 | 21/03/2025 | | |
| | 5 | 24/03/2025 | 28/03/2025 | | |
| | 6 | 31/03/2025 | 04/04/2025 | | |
| **Sprint 2** | 7 | 07/04/2025 | 11/04/2025 | Focus on all SW activities<br>(Requirements Engineering, Analysis, Design and Coding) | 1. Studying the introduced topics<br>2. Development of Sprint 2 |
| | 8 | 14/04/2025 | 18/04/2025 | | |
| | Easter | | | | |
| | 9 | 28/04/2025 | 02/05/2025 | | |
| | Academic Week | | | | |
| | 10 | 12/05/2025 | 16/05/2025 | | |
| **Sprint 3** | 11 | 19/05/2025 | 23/05/2025 | Focus on all SW activities<br>Applying more SW patterns/principles | 1. Studying the introduced topics<br>2. Development of Sprint 3 |
| | 12 | 26/05/2025 | 30/05/2025 | | |
| | 13 | 02/06/2025 | 06/06/2025 | | |
| | 14 | 09/06/2025 | 13/06/2025 | | |
| | 15 | 16/06/2025 | 20/06/2025 | Final Project Assessment | |

# Assessment / Evaluation

- There is **No Final Exam**
  - This is valid for any period of exams (regular, appealing, special)
- 100% by frequency (project-based)
- Each sprint starts on the first Monday and ends at the last Sunday of the sprint development period

| **Iteration** | **Week** | | | | | | | | | | | | | | | **Weight (%)** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | |
| **Sprint 1** | | | 🟦 | 🟦 | 🟦 | 🟦 | 🟧 | 🟧 | | | | | | | | TBD |
| **Sprint 2** | | | | | | | 🟦 | 🟦 | 🟦 | 🟦 | 🟧 | 🟧 | | | | TBD |
| **Sprint 3** | | | | | | | | | | | 🟦 | 🟦 | 🟦 | 🟦 | 🟧 | TBD |

🟦 development period

🟧 presentation/defense

# Some Tips and Rules

- Classes are important
  - Faculty provided documents and presentations do not cover all content in-depth
  - Students' competencies will not be acquired just by reading the bibliography
  - Practice is required → Put your hands on the job
  - All classes (T, TP and PL) are in person (cf. the classroom on your timetable)
- Repository: https://moodle.isep.ipp.pt
  - Documents and presentations
  - Projects/Resolutions
- Basic rules:
  - Do not use cell phones during classes
  - Do not use computers in T and TP classes
  - During classes, do not use software other than that recommended for this course
  - Punctuality: 5 minutes tolerance (T and TP classes)

# About ESOFT Workload

- ESOFT worth 6 ECTS (European Credit Transfer System) credits
  - ECTS is used to measure student workload
  - 1 ECTS credit ≅ 25 to 30 working hours (considering an average student)

- ESOFT workload = 6 ECTS credits x 28 hours = **168 hours** (throughout the semester)
  - Classes workload = 12 weeks x (1h + 1h) + 16 weeks x (3h) = **72 hours**
  - Autonomous workload = 168 hours − 72 hours = **96 hours**
  - **Autonomous workload per week (avg.) ≅ 6 hours/per week**

# Recommended Tools

- Moodle ISEP (https://moodle.isep.ipp.pt)
- PlantUML, Visual Paradigm
- Java IDE (e.g. IntelliJ IDEA)
- Markdown editor/reader
- GitHub

# Recommended Bibliography

- Most important
  - Larman, C. (2004). **Applying UML and Patterns** (3rd ed.). Prentice Hall.
  - Faculty-provided documents and links (available on ISEP’s Moodle).

- Supplementary
  - Freeman, E., & Robson., E. (2021). Head First Design Patterns: Building Extensible and Maintainable Object-Oriented Software (2nd ed.). O’Reilly.
  - Fowler, M. (2003). UML Distilled (3rd ed.). Addison-Wesley.