

PROMPT – Master Courses for Professional Software Developers

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ABSTRACT

PROMPT [1] is an educational initiative in cooperation with several academic parties and leading industrial companies and organizations. Together, the parties offer advanced level courses in software engineering in a web-based format, tailored to fit professional engineers and software developers who need to be able to combine full-time work and studies. The long-term goal of PROMPT is to guarantee the supply of advanced software competencies and innovativeness in industry. The courses are free of charge within Europe, cover typically 7.5 university credits and are run over a whole semester, at a pace of 25% of full-time. All courses are developed in close cooperation with the Swedish industry and trade organizations.

For more detailed information about PROMPT, please visit the project's web site www.promptedu.se.

Categories and Subject Descriptors

K.3.2 [Computer and Information Science Education]

General Terms

Algorithms, Management, Measurement, Documentation, Performance, Design, Reliability, Experimentation, Security, Human Factors, Standardization, Languages, Theory, Verification.

Keywords

Life-long learning, Master courses, Software Engineering, Cooperation Industry-Academia, Distance Courses, On-Line Education

1. INTRODUCTION

The time when an old university degree would give all the knowledge needed for an entire career is over. Today, life-long learning is crucial both for the employer and the employee. The PROMPT project is an initiative sponsored by the Swedish Knowledge Foundation [2] for providing state-of-the art knowledge in software engineering to professional software developers and engineers. This with the aim to strengthen the competitiveness of the Swedish industry on the world market. The project started in 2015 and will end in 2020 with the ambition to then include the PROMPT courses in the participating universities' ordinary curricula.

The PROMPT project is led by the research direction Embedded Systems at Mälardalen University, Sweden, and the courses are given in cooperation with Blekinge Institute of Technology, Chalmers, the University of Gothenburg, Mälardalen University and RISE SICS.

2. THE PROMPT CONCEPT

2.1 Overview

The more than 20 different PROMPT courses are at Master level which means that the PROMPT students need a B.Sc. or similar degree to be eligible for the courses, although validation of corresponding qualifications acquired in other ways is possible. The courses cover

between 2.5 and 7.5 university credits and can be taken in any order. All courses are given in English.

Since the courses are included in the Swedish university admission system they are free of charge for all citizens of the European Union (EU), European Economic Area (EEA) and Switzerland.

2.2 Course Development

Each PROMPT course has been developed in close cooperation with Swedish industry and trade organizations including for example ABB, Ericsson, Saab, SWEDSOFT and the Volvo Group. The teacher/researcher responsible for each course has together with at least five industry representatives upgraded existing Master-level courses or developed new courses suitable for professional software developers and engineers with years of hands-on experience from their work. The course development work gives the teachers/researchers important input from the industry that they can use in their research and in their ordinary campus courses for young students.

2.3 Course Implementation

All PROMPT courses are designed to suit full-time employed professionals living all over the world. This means that all lectures, assignments and exams are on-line, and the PROMPT students can watch a lecture, doing an assignment or exam at any time from any location. Some courses are additionally offering optional campus days. The course material is provided in a 'commuter friendly' format with short sessions, making it possible to study a PROMPT course on for example the bus or train. The PROMPT teachers are available for interaction with the students via email, chats, phone or other communication means. Examination is largely performed via individual or group assignments and students can in several courses bring problems or cases from their work-environment to the course.

Students that pass a PROMPT course will earn university credits at the Master level, i.e. the courses can contribute towards obtaining a Master degree.

3. THE PROMPT COURSES

3.1 Software Development Topics

The PROMPT courses cover different areas related to software development and the software life-cycle. This includes the areas:

- Process and Methods for Developing Software-intensive Systems (6 courses)
- Software Test (6 courses)
- Dependable Software (4 courses)
- Architecture and Design (2 courses)
- Big Data (2 courses)

3.2 The PROMPT Courses

There are more than 20 different PROMPT courses covering various software engineering topics. Each course is typically given once a year. Contrary to campus courses, students can apply for a PROMPT course until the course is started, or even later.

The different PROMPT courses are given either by Blekinge Institute of Technology, the University of Gothenburg or Mälardalen University. All courses are described in detail at the project's web site www.promptedu.se, where also information about the admission procedures can be found.

Table 1. PROMPT courses given in 2018 and 2019

PROMPT Course	Credits
Adaptive Lean Software Testing	7.5
Advanced Software Architecture	7.5
Agile and Lean Development of Software Intensive Products	7.5
Applied Cloud Computing and Big Data	7.5
Applied cybersecurity	5.0
Behavioural Software Engineering	5.0
Continuous Requirements Engineering and Product Management	7.5
Design of Dependable and Fault-Tolerant Embedded Systems	7.5
Distributed Development and Outsourcing	2.5
Evidence-Based Process Change and Improvement	7.5
Industrial Software Development	7.5
Large-Scale Software Testing	2.5
Machine Learning with Big Data	7.5
Model-based Development: Theory and Practice	7.5
Quality assurance – Catching bugs by formal verification	7.5
Quality assurance – Certification of safety-critical (software) systems	7.5
Quality assurance – Model based testing in practice	2.5
Quality assurance – Regression testing and fault prediction	2.5
Quality assurance – The applied science of software testing	7.5
Safety critical software	6.0
Science, research methods and scientific papers, with focus on computer science	7.5
Usability and User Experience	7.5

4. PROMPT CONCLUSIONS

4.1 PROMPT and Life-Long Learning

Life-long learning is becoming crucial for both individuals and industry. This trend is actively supported by the EU, governments, trade organizations, unions and other stakeholders. One of the fastest moving areas is software, currently driven by for example increased automation and the rapid introduction of artificial intelligence and big data. The need for dependable and secure software is evident in for example the development for autonomous vehicles and Internet-of-Things applications. Consequently, the timing for PROMPT is excellent, which is indicated by the rapidly increasing number of students.

4.2 PROMPT Statistics

The development of the PROMPT courses started in 2015 and most of the courses were fully developed and given in 2017. During the fall 2017 semester, there were 23.5 students per course on average. The average age of PROMPT students were 39 years and 17% of the students were women. According to Statistics Sweden [3] the average age for software developers in Sweden is 41 years and 20% of them are women, which shows that the PROMPT students are reasonable representative for the professional software developer community the project is addressing.

Most of the fall 2017 PROMPT students lived in Sweden, but there were also students living in Germany, Greece, Norway, United Kingdom and United States.

5. ACKNOWLEDGMENTS

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6. REFERENCES

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