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Analysis of Agile Software Development Curriculum Syllabus

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Abstract: The training program is a programmatic document to guide a professional training, while the syllabus is a guiding document to guide teachers to conduct curriculum teaching. The syllabus is not purely curriculum oriented, but should serve the objectives of the training program. When the objectives of the training program change, our syllabus should also be adjusted accordingly. A good syllabus is the prerequisite and foundation for teaching a course well. The "agile software development" analyzed in this paper is a limited course for software engineering majors. In the whole teaching and training program, it is a professional course belonging to the branch of software engineering. In the whole training program, the branch courses of software engineering include introduction to software engineering, software process and project management, software architecture, software testing and quality assurance, and agile software development. This course is offered on the basis that the students of this major have mastered the basic principles and methods of software engineering, and understand and master the application and practice methods of software engineering ideas in practical projects. This paper gives a detailed introduction to the latest agile software development curriculum, which has been revised for many years, from the aspects of teaching objectives, teaching content, teaching methods, assessment methods, etc., hoping to provide reference for educators engaged in teaching related courses.

Keywords: Syllabus, Agile Software Development, Teaching Objectives

1. Introduction

User needs have become more diverse, which has a great impact on the traditional software development model [1, 2]. Its model characteristics are difficult to adapt to the rapidly changing diversity needs of users, and gradually show the drawbacks of the current Internet software development [3-5]. People urgently need a more flexible, efficient and adaptive software development model to make up for these drawbacks [6]. While the traditional software development mode has not changed much, the Internet and the software industry have been developing rapidly, which makes the competition within the industry increasingly fierce [7]. In the development process of an application software, it is not only necessary to make a rapid response to the diversity and rapid changes of user needs, but also necessary to consider the progress and cost of development and the quality and maintenance of software after delivery to users [8, 9]. In the context of the

rapid development of the Internet industry, it also promotes the proposal and research of new concepts and technologies [10]. The technical means of software development are also being rapidly updated [11]. Some large-scale software systems have not even been developed yet, and the development technologies used have been updated [12]. Therefore, how to accurately grasp the needs of users and use efficient and rapid development methods to make the products that users need is very important for software enterprises [13]. Therefore, the idea of agile software development emerges as the times require, and the emphasis of this method is to respond quickly to the changes of user needs [14].

Agile development takes the evolution of users' needs as the core, and adopts an iterative and step-by-step approach to software development [15]. This method is a software development method that adapts to the typical challenges faced by software engineering at present: changing requirements and fast delivery. This course will introduce the basic principles and methods of agile software development, and let students

understand the practical methods of agile development in combination with scrum. "Agile software development" introduced this time is a limited course for software engineering majors. In the whole teaching and training program, it is a professional course belonging to the branch of software engineering. In the whole training program, the branch courses of software engineering include introduction to software engineering, software process and project management, software architecture, software testing and quality assurance, and agile software development. This course is offered on the basis that students of this major have mastered the basic principles and methods of software engineering, and understand and master the application and practical methods of software engineering ideas in practical engineering.

2. Curriculum Teaching Objectives

The overall teaching objective is to enable students to master the basic concepts, theories, principles and application methods of agile software development. Through the study of this course, students are required to achieve the following objectives:

Course objective 1: understand the agile concept, master the practical methods of extreme programming, and master the scrum framework.

Course objective 2: solve practical problems in the form of teams by using the agile theories, methods and agile processes learned.

3. Relationship Between Course Objectives and Graduation Requirements

The relationship matrix between the learning objectives and graduation requirements of this course is shown in Table 1. The curriculum objectives can effectively support the graduation requirements index points.

Table 1. Relationship matrix between curriculum objectives and graduation requirements.

Course objectives	Graduation requirement index point
Course objective 1	2.3 be able to use the knowledge learned, recognize various solutions to software engineering problems, and seek alternative solutions through literature research. 4.2 be able to select research routes and design experimental schemes according to the characteristics of software engineering problem objects. 9.1 have good communication and teamwork skills.
Course objective 2	2.3 be able to use the knowledge learned, recognize various solutions to software engineering problems, and seek alternative solutions through literature research. 4.2 be able to select research routes and design experimental schemes according to the characteristics of software engineering problem objects. 9.1 have good communication and teamwork skills.

4. Teaching Contents and Requirements

The teaching contents and methods of this course and the matrix supporting the course objectives are shown in Table 2:

Table 2. Teaching contents, methods and curriculum objective matrix of the course.

Course objectives	content of courses	teaching method
Course objective 1	Overview of agile software development, in-depth understanding of agile concepts, overview of extreme programming, Scrum and agile software development process.	Lecture and case analysis
Course objective 2	Guide students to complete a complete agile practice project in the form of a team.	Teaching and Practice

The specific teaching contents required by this course are given below. The lecturer can expand and guide students in some aspects according to the students' conditions and their own experience, so as to appropriately expand the students' range of knowledge.

4.1. Related Theories of Agile Software Development

This part mainly introduces the relevant principles and methods of agile development from the conceptual level, including:

4.1.1. Overview of Agile Software Development

The basic values and principles of agile software development and eight misunderstandings of agile software development.

4.1.2. Deep Understanding of Agile Concept

In depth understanding of "focusing on customer value", in-depth understanding of "motivating the team" and in-depth understanding of "adapting to change".

4.1.3. Overview of Extreme Programming

The concept and criterion of extreme programming and the successful practice method of extreme programming.

4.1.4. Scrum Agile Software Development Process

Scrum overview, roles and responsibilities, product requirement list, iteration task list and planning meeting, iteration product submission, daily regular meeting, iteration review, iteration review meeting, application of poker poker method in scrum, application practice of Scrum method.

Key points: scrum and agile software development process;

Difficulty: deeply understand agile concept.

Focus on supporting graduation requirements index points 2.3, 4.2 and 9.1.

4.2. Agile Software Practice

Freely combine to form a project team, and use 24 class hours to complete the agile development process of a system of your choice.

Focus on supporting graduation requirements index points 2.3, 4.2 and 9.1.

5. Arrangement and Requirements of Teaching Links

5.1. Classroom Teaching

Through the classroom teaching of this course, first of all, students should master some basic concepts, theories and methods specified in the teaching content of the course. Especially through the teacher's teaching, students can have a deeper understanding of these basic concepts and theories, and be able to apply them to solving some problems. We should pay attention to the analysis of the core ideas of some of the basic methods so that students can master the key.

In the process of classroom teaching, pay attention to the introduction of cases, cooperate with concept teaching, and let students better understand the relevant concepts and principles of agile development.

Use multimedia courseware, cooperate with blackboard writing and example demonstration to teach the course content. Properly guide students to read foreign books and materials, and guide students to use extracurricular resources for self-study.

5.2. Practical Teaching

This course focuses on practical teaching. In the process of practical teaching, students choose a project of their own and complete at least two iterative development according to the agile development process. Students are required to apply the principles, methods and processes of agile development in practice. Please refer to "Agile Software Development Experimental Teaching Syllabus" for specific requirements.

6. Teaching Method Guidance

Theory Teaching: the first theme in the teaching process is theory teaching, which mainly introduces the relevant concepts of agile development, including the agile development process, principles, methods, etc. Let students have a theoretical understanding of agile development before specific practice, and lay a foundation for subsequent practice.

Practice Teaching: in the 24 class hours of practice, students will be divided into groups freely to guide them to complete an agile development process in groups.

7. Learning Method Guidance

In the learning process of this course, students should adopt the following learning methods:

(1) Exploratory learning: during the teaching process, exploratory expansion should be carried out around the core concepts in the teaching process to ensure the enrichment of the knowledge system;

(2) Combining with practice: we should actively apply the teaching contents to practical projects, understand the core concepts through practice, and master their application methods.

8. Class Hour Allocation

Class hour allocation is shown in Table 3.

Table 3. Class hour allocation.

Chapter	Primary coverage	Class hour allocation		total
		lecture	experiment	
1	Overview of agile software development	2		2
2	Deep understanding of agile concept	2		2
3	Overview of Extreme Programming	2		2
4	Scrum agile software development process	2		2
5	Agile software practice		24	24
total		8	24	32

9. Assessment and Performance Evaluation

The evaluation contents and methods of this course and the relationship matrix supporting the course objectives are shown in Table 4.

Table 4. Relationship matrix between curriculum objectives and assessment contents and methods.

Course objectives	Assessment contents	Assessment method	Assessment materials
Course objective 1	Agile concept, practice method of extreme programming, Scrum framework.	practice	Agile software development course report, student review form, teacher review form
Course objective 2	The ability to solve practical problems in the form of a team by using the agile theories, methods and agile processes learned.	practice	Agile software development course report, student review form, teacher review form

9.1. Curriculum Comprehensive Scoring Method

The assessment results of this course are based on the 100 point system. The course results are composed of attendance results and experimental results. The proportion of each part is as follows:

(1) Attendance scores account for 5%, mainly assessing the enthusiasm of class.
(2) The experimental results accounted for 95%, mainly investigating the students' understanding and mastery of the knowledge learned.

9.2. Scoring Criteria

9.2.1. Attendance Results

A total of 5 random attendance times, 1 point will be deducted for each absence, and no point will be deducted for medical reasons with the hospital certificate.

9.2.2. Experimental Results

The experimental results were assessed according to the student and teacher evaluation form.

10. Conclusion

The syllabus of this course is a teaching guidance formed through many years of precipitation. In the future, it will improve the deficiencies in teaching in time according to the changes in the standards of professional certification, the positioning of the school, the focus of professional development, the feedback of students, experts, and the feedback of various assessment results of the course. It will be implemented in the next round of course teaching to ensure that the corresponding graduation requirements are met. I hope that the vast number of colleagues engaged in agile software development teaching can share more good experiences and process documents in teaching, and jointly promote the vigorous development of agile software development talents.

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