NATIONAL AVIATION UNIVERSITY
Computer Technologies Institute
Computer Science Faculty
Software Engineering Department

Index: P 08 – 6.050103 – a – 35

"Approved"
Deputy Rector for Academics

_____A.Polukhin
"_____" _____2009

**SYLLABUS**
of the discipline
**"Software assurance and testing"**
(according to ECTS)

Branch:   6.050103   - "Software Engineering"

Year                                – 3 year          Semester – 5
Lectures                            – 34               Exam     – 5 semester
Laboratory works            – 34
Self study                        – 76
Total                               – 144
Graphical Calculating Work – 1 (5 semester)

Kyiv – 2009

Syllabus is based on the Curriculum № РБ – 4 – 103 – a / 08 branch 6.050103 – "Software Engineering", academic program of the discipline «Software assurance and testing» index Н – 4 – 6.050103 – 35 approved of "___"_____ 2009, "Provisional regulations on training according to ECTS (within the pedagogical experiment) and "Provisional Regulations on the assessment grading system" approved by the Rector of the University (order № 122 of 15.06.2004).

Developed by:
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Discussed at the meeting of the Software Engineering Department, Minutes № __ of _____ 2009

Head of the Department                                              M. Sidorov

The Syllabus has been discussed and approved by the Scientific – Methodological – Editorial Committee of the Computer Technology Institute, Minutes № ____ of "___"_____ 2009

Head of Committee                    _____                    L.Ivanova

"Approved"
Dean of the Computer Science Faculty
_____ N.Sidorov
_____2009

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## INTRODUCTION

The syllabus on each discipline is a must for successful teaching process organization according to the European Credit Transfer System. Teachers and students are to be familiarized with it. Grading system is an integral part of the syllabus and provides for assessment of student's knowledge and skills during current, module and semester checks.

Grading procedure is performed according to national grading scale and European Credit Transfer System grading scale.

## 1. REFERENCE NOTES

### 1.1. Aim of the discipline

The purpose of teaching discipline is to teach students skills relevant modern paradigms and technologies of the software quality.

### 1.2. Tasks for the discipline study

The main tasks for the discipline study are to study how to guarantee software quality through performing proper testing and maintenance. Students learn techniques to design and implement tests, to conduct inspections by applying well proven techniques, and to employ release and maintenance procedures. In order to achieve a culture of excellence, the management aspects of QA process will also be addressed.

### 1.3. The discipline position in the curriculum system

Academic discipline is arming the software engineer of software development methodology that meets quality standards. The attention is paid to the culture of quality and quality assurance at all stages of software development.

### 1.4. Integrated requirements concerning the discipline skills

As the result of mastering the discipline a student should:

**Know:**
- how to establish and manage a code review team;
- how to carry out black-box/white-box/gray-box testing;
- how to carry out static and dynamic analysis of software;
- when to stop testing and carry out return on investment analysis for QA;
- how to build up releases, and carry out alpha/beta testing;
- how to perform final release and package and maintain the software after final release.

**Learning outcomes:**
- understanding the process, roles, and management aspects of software testing, quality assurance, and maintenance;
- understanding that quality assurance is a process instead of an add-on to the products;
- understanding how to design test cases,verification and validation techniques in QA process;
- knowledge about undecidability issues in software verification;
- design problem analysis and reporting systems;
- knowledge about maintenance testing technologies and tools;
- knowledge about testing techniques for Object-Oriented software package;
- becoming familiar with quality process standards such as TQM and ISO.

### 1.5. Integrated requirements concerning the modules skills

The material for the course is structured according to a module principle and consists of two modules.

1.5.1. As a result of mastering the material of the module №1 "Software quality assurance" the student should:
**KNOW:**
- methods for quality assurance and verification;
- software engineering code of ethics;
- software quality assurance framework.
**BE ABLE TO:**
- establish and manage a code review team;
- create and perform the software quality assurance plans, understand how to design test cases;
- conduct collaborative software inspections.

1.5.2. As a result of mastering the material of the module №2 "Software testing" the student should:
**KNOW:**
- spiral testing technologies and tools;
- maintenance testing technologies and tools;
- testing techniques for Object-Oriented software package.
**BE ABLE TO:**
- carry out unit testing;
- carry out white-box/grey-box/black-box testing
- carry out coverage analysis;
- design problem analysis and reporting systems.

### 1.6. Interdisciplinary connections of the discipline

The discipline is based on the knowledge and practical skills in the disciplines such as: "Fundamentals of Programming", "Group dynamics and communication, "Object-oriented programming".

Discipline provides learning of following disciplines: "Architecture and designing of software engineering", "Management of software engineering projects", "Software evolution", "Research systems". Skills obtained while this discipline study will be used further for majority of disciplines from the curricula.

## 2. THE DISCIPLINE CONTENT

### 2.1.  Topical plan of the discipline

| № | Topic | Volume of training sessions, hours | | | |
|---|---|---|---|---|---|
| | | Total | Lectures | Laboratories | Self study |
| **Module № 1 „ Software quality assurance"** | | | | | |
| 1.1 | Software Quality Assurance Fundamentals | 23 | 6 | 6 | 11 |
| 1.2 | Software Quality Models and Characteristics | 17 | 4 | 4 | 9 |
| 1.3 | Software quality management processes | 20 | 6 | 4 | 10 |
| 1.4 | Module Test № 1 | 4 | | 2 | 2 |
| | **Total for module № 1** | **64** | **16** | **16** | **32** |
| **Module № 2 „Software testing"** | | | | | |
| 2.1 | Software Testing Fundamentals. Test Levels. | 23 | 6 | 6 | 11 |
| 2.2 | Test Techniques | 23 | 6 | 6 | 11 |
| 2.3 | Testing Results Analysis. Methodologies of quality improvement in the modern paradigm | 20 | 6 | 4 | 10 |
| 2.4 | Graphical Calculating Work | 10 | | | 10 |
| 2.5 | Module Test № 2 | 4 | | 2 | 2 |
| | **Total for module № 2** | **80** | **18** | **18** | **44** |
| | **Total for the discipline** | **144** | **34** | **34** | **76** |

### 2.2. Development of didactic process for types of classes

2.2.1. Lectures, their subject matters and volume

| N | Topics | Volume of training sessions (hours) | |
|---|---|---|---|
| | | Lectures | Self study |
| 1 | 2 | 3 | 4 |
| **Module № 1 "Software quality assurance"** | | | |
| 1.1 | Software Quality Fundamentals. Software Engineering Code of Ethics and Professional Practice | 2 | 2 |
| 1.2 | Software Quality Function Deployment | 2 | 2 |
| 1.3 | Software Quality Assurance and management | 2 | 2 |
| 1.4 | Code Metrics | 2 | 2 |
| 1.5 | Models of Software Quality | 2 | 2 |
| 1.6 | Code Reviews | 2 | 2 |
| 1.7 | Inspections | 2 | 2 |
| 1.8 | Verification & Validation | 2 | 2 |
| | **Total for module № 1** | **16** | **16** |

| | Module № 2 " Software testing " | | |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| 2.1 | Software Testing Fundamentals | 2 | 2 |
| 2.2 | Unit testing. White-box, grey-box, black-box testing. | 2 | 2 |
| 2.3 | Objectives of Testing. | 2 | 2 |
| 2.4 | Test Techniques Classification. | 2 | 2 |
| 2.5 | Test-related measures | 2 | 2 |
| 2.6 | Testing Tools. Cost, effort estimation | 2 | 2 |
| 2.7 | Test Process. Test results evaluation. | 2 | 2 |
| 2.8 | Test Activities and Test documentation. | 2 | 2 |
| 2.9 | Methodologies of quality improvement in the modern paradigm | 2 | 2 |
| | **Total for module № 2** | **18** | **18** |
| | **Total for the discipline** | **34** | **34** |

2.2.2. Laboratories, their subject matters and volume.

| № | Topic | Classes volume, hours. | |
|---|---|---|---|
| | | Laboratories | Self study |
| 1 | щ                          2 | 3 | 4 |
| | **Module № 1 "Software quality assurance"** | | |
| 1.1 | Assessing quality of software application | 6 | 5 |
| 1.2 | Using Code Metrics for software analysis | 4 | 5 |
| 1.3 | Collaborative Software inspection | 4 | 4 |
| 1.4 | Module test №1 | 2 | 2 |
| | **Total for module № 1** | **16** | **16** |
| | **Module № 2 "Software testing"** | | |
| 2.1 | Unit Testing | 6 | 5 |
| 2.2 | Web Application Testing | 6 | 5 |
| 2.3 | Testing process phases research and reporting | 4 | 4 |
| 2.4 | Module test №2 | 2 | 2 |
| | **Total for module № 2** | **18** | **16** |
| | **Total for the discipline** | **34** | **32** |

### 2.2.3. Self studying and testing

| № week | Self study (SS) topical content | SS | Control | № of the week controlled |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 1 | To work on the material of lecture № 1.1 | 2 | CC | 1 |
| 1 | Preparation for the laboratory class № 1.1 | 1 | CC | 2 |
| 2 | To work on the material of lecture № 1.2 | 2 | CC | 2 |
| 2 | Preparation for the laboratory class №1.1 | 2 | CC | 3 |
| 3 | To work on the material of lecture № 1.3 | 2 | CC | 3 |
| 3 | Preparation for the laboratory class № 1.1 | 2 | CC | 4 |
| 4 | To work on the material of lecture № 1.4 | 2 | CC | 4 |
| 4 | Preparation for the laboratory class № 1.2 | 2 | CC | 5 |
| 5 | To work on the material of lecture № 1.5 | 2 | CC | 5 |
| 5 | Preparation for the laboratory class №1.2 | 3 | CC | 6 |
| 6 | To work on the material of lecture № 1.6 | 2 | CC | 6 |
| 6 | Preparation for the laboratory class №1.3 | 1 | CC | 7 |
| 7 | To work on the material of lecture № 1.7 | 2 | CC | 7 |
| 7 | Preparation for the laboratory class № 1.3 | 2 | CC | 7-8 |
| 8 | To work on the material of lecture № 1.8 | 2 | CC | 8 |
| **8** | **Preparation for the module test №1** | **2** | **MC** | **8** |
| 9 | To work on the material of lecture № 2.1 | 2 | CC | 9 |
| 9 | Preparation for the laboratory class № 2.1 | 1 | CC | 10 |
| 10 | To work on the material of lecture № 2.2 | 2 | CC | 10 |
| 10 | Preparation for the laboratory class № 2.1 | 2 | CC | 11 |
| 10-15 | Execution of Graphical Calculating Work | 10 | defence of GCW | 15 |
| 11 | To work on the material of lecture № 2.3 | 2 | CC | 11 |
| 11 | Preparation for the laboratory class № 2.1 | 2 | CC | 12 |
| 12 | To work on the material of lecture № 2.4 | 2 | CC | 12 |
| 12 | Preparation for the laboratory class № 2.2 | 1 | CC | 13 |
| 13 | To work on the material of lecture № 2.5 | 2 | CC | 13 |
| 13 | Preparation for the laboratory class № 2.2 | 2 | CC | 14 |
| 14 | To work on the material of lecture № 2.6 | 2 | CC | 14 |
| 14 | Preparation for the laboratory class №2.2 | 2 | CC | 15 |
| 15 | To work on the material of lecture № 2.7 | 2 | CC | 15 |

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| 15 | Preparation for the laboratory class № 2.3 | 1 | CC | 16 |
| 16 | To work on the material of lecture № 2.8 | 2 | CC | 16 |
| 16 | Preparation for the laboratory class № 2.3 | 2 | CC | 17 |
| 17 | To work on the material of lecture № 2.9 | 2 | CC | 17 |
| **17** | **Preparation for the module test №2** | **2** | **MC** | **17** |
| **Total** | | **76** | | |

### 2.2.3.1. **Graphical Calculating Work**

Graphical Calculating Work (GCW) is in the fifth semester, according to the approved guidelines established order, and needed to consolidate the practical knowledge obtained by students at lectures and laboratory works.

The specific objective GCW includes the usage of automated testing tools that is scaned for details of a given subject area.

Execution, reporting and defence of GCW students do on an individual basis according to the guidelines. The main report includes: description of the subject area and reports prepared for the results of the testing. The volume of the main report is about 10 - 15 pages.

The time required to perform GCW is - 10 hours of self study.

# 3. TEACHING METODICAL MATERIALS FOR DISCIPLINE

## 3.1. The main and secondary literature

### Main literature

3.1.1. Андон Ф.И., Коваль Г.И., Коротун Т.М., Лаврищева Е.М., Суслов В.Ю Основы инженерии качества программных систем. – 2-е изд., перераб. и доп. – К.: Академпериодика, 2007. – 672 с.

3.1.2. Блэк Р. Ключевые процессы тестирования. Планирование, подготовка, проведение, совершенствование.: Пер.с англ. - М.: Изд.: Лори, 2006. – 544 с.

3.1.3. Брауде Э. Дж. Технология разработки программного обеспечения . – СПб.: Питер, 2004. – 655 с.:ил.

3.1.4. Гагарина Л.Г., Кокорева Е.В., Виснадул Б.Д. Технология разработки программного обеспечения: учебное пособие / под ред. Л.Г. Гагариной. – ИД «Форум»: ИНФРА-М, 2008. – 400 с.:ил.

3.1.5. Дастин Э., Рэшка Дж., Пол Дж. Автоматизированное тестирование программного обеспечения.: Пер.с англ.-М.: Изд-во: Лори, 2003. – 592 с.

3.1.6. Канер С., Фолк Дж., Нгуен Е.К. Тестирование программного обеспечения. Фундаментальные концепции менеджмента бизнес-приложений: Пер. с англ. – К.: Издательство «Диасофт», 2001. – 544 с.

3.1.7. Лаврищева Е.М., Петрухин В.А. Методы и средства инженерии программного обеспечения: Учебник. – М.: МФТИ(ГУ), 2006. – 304 с.

3.1.8. Соммервилл И. Инженерия программного обеспечения, 6-е изд.: Пер. с англ. – М.: Вильямс, 2002. – 624 с.: ил.

3.1.9. Тамре Л. Введение в тестирование программного обеспечения.: Пер. с англ. – М.: Издательский дом «Вильямс», 2003. - 368 с.

3.1.10. Шафер Д., Фарелл Р., Шафер А. Управление программными проектами: достижение оптимального качества при минимуме затрат.: Пер. с англ. – М.: Издательский дом «Вильямс», 2003. - 1136 с.

### Secondary literature

3.1.11 Буч Г. Объектно-ориентированное проектирование с примерами применения. Пер. с англ. – М.: Конкорд, 1992, - 406 с.

3.1.12 ДСТУ 2850-94. Програмні засоби ЕОМ. Показники і методи оцінювання якості.

3.1.13 ДСТУ 2462-94. Сертифікація. Основні поняття, терміни та визначення.

3.1.14 Калбертсон Р., Браун К., Кобб Г. Быстрое тестирование.: Пер. с англ. – М.: Издательство: Вильямс, 2002. - 384 с.

3.1.15 Липаев В.В. Обеспечение качества программных средств. Методы и стандарты. Серия «Информационные технологии». – М.: СИНТЕГ, 2001.- 380 с.

3.1.16 Макгрегор Дж., Сайкс Д. Тестирование объектно-ориентированного программного обеспечения. Практическое пособие. - К.: DiaSoft, 2002. - 432 с.

## 4. STUDENTS' KNOWLEDGE AND SKILLS GRADING SYSTEM

### 4.1. Basic Terms, Concepts, Definitions

4.1.1. **Semester Examination** is a form of final check of how well a student has mastered both theoretical and practical material in a given subject during a semester.

Written examination is held during the examination period in the presence of a board of examiners headed by the chief of the department in accordance with the established time-table.

4.1.2. **ECTS system** is a model of academic process organization based on a combination of two constituents: module technology of training and credits (Test Units) and covers the content, forms and facilities of academic process, forms of checking students' knowledge and skills quality as well as academic activity of students both in class and outside it (i.e. self-study). The ECTS system aims at making students work on a systematic basis during the semester in view of their future professional success.

4.1.3. **A module** is a logically complete, relatively independent integral part of a training course, a set of theoretical and laboratory tasks of relevant content and structure with an elaborated system of methodical, educative, individual and technological support, a necessary component of which is an appropriate form of grading.

4.1.4. **A credit (test unit)** is a single unit of measuring work done by students both in class and outside it (Academic Load) which is equivalent to 36 working hours.

4.1.5. A grade is a quantitative measuring unit of students' learning outcomes assessment, based on a multi-value scale as they perform their pre-assigned set of academic tasks.

4.1.6. **The ECTS grading system** is a system of measuring the quality of all types of classroom and self-study work done by students as well as the level of their knowledge and skills by assessing them in values according to the 100-value scale with further transfer of these values into the national scale and the ECTS scale.

The grading system envisages the use of the following grades: the current module grade, the module test grade, the total module grade, the semester module grade, the examination grade and the total semester grade.

4.1.6.1. **The current module grade** consists of values which a student gets for a certain kind of academic work in mastering a given module, i.e. doing and defending his/her individual tasks at laboratory classes.

4.1.6.2. **The module test grade** is determined in values and in national scale grades as a result of doing the module test.

4.1.6.3. **The total module grade** is determined in values and in national scale grades as the sum of the current module grade and test module grade.

4.1.6.4. **The semester module grade** is determined in values and in national scale grades as the sum of the total module grades obtained after studying the material of all the modules within a semester.

4.1.6.5. **The examination grade** is determined in values and in national scale grades in the result of carrying out the examination tasks.

4.1.6.6. **The total semester grade** is determined as the sum of the semester module grade and the examination/differentiated test grade in values, national scale grades and ECTS scale grades.

The total grade in a discipline taught during a few semesters is determined as the average of the total semester grades in values with its further transfer into the national scale and the ECTS scale. The total grade in a discipline is entered into the Appendix to the Specialist's diploma.

### 4.2. Grading Scale for Students' Learning Outcomes Assessment

4.2.1. Grading of different kinds of academic work performed by a student is done in accordance with Table 4.1.

Table 4.1

| Module №1 | | Module №2 | | Max Grade |
|---|---|---|---|---|
| Kind of Academic Work | Max Grade | Kind of Academic Work | Max Grade | |
| Performance of lab №1.1 | 9 | Performance of lab №2.1 | 9 | |
| Performance of lab №1.2 | 9 | Performance of lab №2.2 | 9 | |
| Performance of lab №1.3 | 9 | Performance of lab №2.3 | 9 | |
| | | Performance of GCW | 14 | |
| Module Test №1 | 10 | Module Test №2 | 10 | |
| Total Module Grade №1 | 37 | Total Module Grade №2 | 51 | |
| Semester Exam | | | | 12 |
| Total Semester Grade | | | | 100 |

4.2.2. Executed training work is credited to a student if he has received a positive mark for this work in national scale under the table 4.2.

4.2.3. Additional grades (one grade for each kind of work) may be awarded to a student for other kinds of academic work he/she has done within the given module.

Table 4.2

Correspondence between Grade Values in different types of work and the National Scale

| Grade Value | | | National Scale |
|---|---|---|---|
| Execution and defence of laboratory work (module #1, #2) | Execution and defence of GCW(module #2) | Module Test (module #1, #2) | |
| 8-9 | 13-14 | 9-10 | excellent |
| 7 | 11-12 | 8 | good |
| 5-6 | 9-10 | 6-7 | satisfactory |
| under 5 | under 9 | under 6 | bad |

4.2.4. The grades a student has been given for the different kinds of academic work are summed up and the result constituting a Current Module Grade is entered into the Module Grade Register.

4.2.5. If a student has successfully done all kinds of academic work within the given module and has got a positive Current Module Grade – not less than satisfactory according to the national scale, he/she is allowed to take his/her module test.

4.2.6. Students have their module test in a written form. The procedure, which lasts up to two academic hours, is held by a commission headed by the head of the department responsible for the discipline.

4.2.7. The Current Module Grade and the Module Test Grade together make up a Total Module Grade whose correspondence to the National Scale is shown in Table 4.3.

Table 4.3

Correspondence between Total Module Grade Values and the National Scale

| Total Module №1 Grade Values | Total Module № 2 Grade Values | National Scale |
|---|---|---|
| 33-37 | 46-51 | excellent |
| 28-32 | 38-45 | good |
| 22-27 | 31-37 | satisfactory |
| under 22 | under 31 | bad |

4.2.8. A student is considered to have passed the module if both his/her Current Module Grade and Module Test Grade are positive, i.e. higher than 'bad' according to the national scale (Table 4.2), which yields a positive Total Module Grade (Table 4.3).

4.2.9. If a student has missed the module test due to any reason (being ill, debarred, etc.), the entry 'absent' is made against his/her name in the column 'Module Test Grade' and the entry 'unclassified' – in the column 'Total Module Grade'.

Attention! If the Module Test Grade is "bad", it shall not to be added to the Current Module Grade, and the student is considered to have failed this module. Otherwise he/she is considered as having an academic incomplete.

Further testing the student in this module is done in accordance with the established procedure.

4.2.10. If the Module Test Grade is "bad", it shall not to be added to the Current Module Grade, and the student is considered to have failed this module.

4.2.11. A Module Test Grade that a student can be given after the second testing cannot be higher than 'good' according to the national scale, i.e. the grade value presented in Table 4.2 is reduced by 2.

4.2.12. A student is not allowed to increase his/her positive Total Module Grade by taking a repetitive test.

4.2.13. The Semester Module Grade is calculated as the sum of the Total Module Grades. The correspondence between Semester Module Grade values and the National Scale is given in Table 4.4.

4.2.14. A student having a positive (higher than 'bad' according to the national scale) Semester Module Grade is allowed to take a semester exam.

4.2.15. Students have their semester exam in a written form. The procedure, which lasts up to two academic hours, is held by a commission headed by the head of the department responsible for the discipline.

4.2.16. A student who has got a positive (higher than 'bad' according to the national scale) examination grade (Table 4.5) is considered to have passed the semester course in this discipline.

Otherwise the student is to be re-examined in accordance with the established procedure.

Table 4.4

Correspondence between Semester Module Grade Values and the National Scale

| Semester Grade Values | National Scale |
|---|---|
| 79-88 | excellent |
| 66-78 | good |
| 53-65 | satisfactory |
| under 53 | bad |

Table 4.5

Correspondence between Examination Grade Values and the National Scale

| Semester Grade Values | National Scale |
|---|---|
| 11-12 | excellent |
| 9-10 | good |
| 7-8 | satisfactory |
| under 7 | bad |

4.2.17. An Examination Grade obtained by a student in the result of re-examination cannot exceed 10 ('good' according to the national scale), i.e. the grade value presented in Table 4.5 is reduced by 2.

4.2.18. The Semester Module Grade and the Examination Grade together make up a Total Semester Grade whose correspondence to the National Scale and the ECTS Scale is shown in Table 4.6.

4.2.19. A student has the right to get his/her Total Semester Grade without taking a semester exam if, throughout the whole semester, he/she has done all the kinds of academic work in time and has got a positive (higher than 'bad' according to the national scale) Semester Module Grade.

4.2.20. To be allowed not to take the exam, a student shall submit a written application to the Dean of the Faculty. A specimen of the application is given in Table 4.7.

Table 4.6

Correspondence of Total Semester Grades to the National Scale and the ECTS Scale

| Total Semester Grade Values | National Scale | ECTS Scale | |
|---|---|---|---|
| | | Оцінка | Пояснення |
| 90-100 | Excellent | A | Excellent (excellent performance with insignificant shortcomings) |
| 82 – 89 | Good | B | Very Good (performance above the average standard with a few mistakes) |
| 75 – 81 | | C | Good (good performance altogether with a certain number of significant mistakes) |
| 67 – 74 | Satisfactory | D | Satisfactory (performance meets the average standards) |
| 60 – 66 | | E | Sufficient (performance meets the minimal criteria) |
| 35 – 59 | Bad | FX | Bad (bad performance; a second testing is required) |
| 1 – 34 | | F | Bad (very bad performance; a student shall retake the course) |

Table 4.7.

A Specimen of an Application to Be Allowed not to take a Semester Exam

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25 Dec 2009

Prof. M. Sidorov,
Dean of the Computer Science Faculty

Dear Sir,
This is to inform you that in the 5th semester of the 2009-2010 academic year I have passed both modules in the discipline «Software assurance and testing» in due time with positive Total Module Grades (32 and 42 respectively), and have a positive Semester Module Grade – 74 ('good' according to the National Scale). I would like to ask you to allow me not to take a semester exam in this discipline (teacher: M. Bezverkha), my Total Semester Grade being 74+9=83 ('good' according to the National Scale and 'B' – to the ECTS Scale).

Sincerely yours

Agreed                                          (Signature)
(Signature)                                    O. Shapoval,
M. Bezverkha                               a student of group 308

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4.2.21. A student who, throughout the whole semester, has done all the kinds of academic work in time (without delays) and without repetitive module tests, has got a positive (higher than 'bad' according to the national scale) Semester Module Grade, and has decided not to take the exam gets his/her Total Semester Grade as the sum of his/her Semester Module Grade and the minimal Examination Grade established for each category of Semester Module Grades **(11 for "Excellent", 9 for "Good, and 7 for "Satisfactory").**

4.2.22. If a student who was obliged to take an exam has missed it due to any reason (being ill, debarred, etc.), the entry 'absent' is made against his/her name in the column 'Examination Grade' and the entry 'unclassified' – in the column 'Total Semester Grade'.

In this case the student is considered as not having an academic incomplete if he/she is allowed to take his/her exam but has missed it due to a valid reason. Otherwise he/she is considered as having an academic incomplete.

Further testing the student in this module is done in accordance with the established procedure.

4.2.23. A student is not allowed to increase his/her positive Total Semester Grade by taking a repetitive test or exam.

4.2.24. The Total Semester Grade is entered into the Examination Register and into a student's record book in values, National Scale grades, and ECTS Scale grades.

**4.2.25. The Total Semester Grade is entered into a student's record book, for example: 92/Ex/A, 87/Good/B, 79/Good/C, 68/Sat/D, 65/Sat./E,** etc.