

**Syllabus**  
**Academic Year 2023 -2024**

<b>1. General information</b>	
Course title	“Software Design Patterns”
Degree cycle (level)/ major	6B06101 Computer Science 6B06102 Software Engineering
Year, semester	2, 1
Number of credits	5
Language of delivery:	English
Prerequisites	Algorithms and data structures.
Postrequisites	No Postrequisites
Lecturer(s)	1. Angsar Aidarbek, MSc in Data Science, senior – lecturer, <a href="mailto:242650@astanait.edu.kz">242650@astanait.edu.kz</a> .
Practitioner(s)	1. Akylbek Maxutov, MSc in Data Science, <a href="mailto:242681@astanait.edu.kz">242681@astanait.edu.kz</a> 2. Bakbergen Mendaliyev, MSc in Applied Data Analytics, <a href="mailto:242624@astanait.edu.kz">242624@astanait.edu.kz</a> 3. Dastan Kapizov, MSc in Applied Data Analytics, <a href="mailto:222233@astanait.edu.kz">222233@astanait.edu.kz</a> 4. Daniyal Ganiuly, MSc in Computer Science and Engineering <a href="mailto:242653@astanait.edu.kz">242653@astanait.edu.kz</a> 5. Almas Alzhanov, MSc in Applied Data Analytics, <a href="mailto:242638@astanait.edu.kz">242638@astanait.edu.kz</a> 4. Miras Mussabek, MSc in Computer Science and Engineering <a href="mailto:242677@astanait.edu.kz">242677@astanait.edu.kz</a> 5. Saltanat Sharipova, MSc in Computer Science and Engineering,

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<b>2. Goals, objectives and learning outcomes of the course</b>	
1. Course description	“Software Design Patterns” is a 10-week course. This course covers software design patterns principles and techniques using Java. Topics include creational, structural, behavioral design patterns and SOLID principles. This course also covers basic concepts for software design and reuse.
2. Course goal(s)	Course goal is to provide a solid background in software design patterns principles for computer science, telecommunication and information security students, in preparation either for a job in industry or for more advanced courses at the graduate level.
3. Course objectives:	Course objectives include: <ul style="list-style-type: none"> <li>- To understand and demonstrate the concepts of software design patterns, polymorphism, information hiding, and inheritance;</li> <li>- To understand the role that methods play in an software design patterns;</li> <li>- To understand the concept of a class hierarchy;</li> <li>- To become familiar with the relationship between classes and objects in a Java program</li> </ul>
4. Skills & competences	<ul style="list-style-type: none"> <li>- Solve problems using various Java language and library features;</li> <li>- Understand and use software design patterns concepts to develop reusable, reliable, and maintainable software.</li> </ul>
5. Course learning outcomes:	By the end of this course the students will be able to: <ul style="list-style-type: none"> <li>- apply standards and principles to write truly readable code.</li> <li>- design a class that serves as a program module or package.</li> <li>- present a general understanding of the programming language Java, for example by solving simple programming assignments.</li> </ul>
6. Methods of assessment	- Theoretical and practical assessments.
7. Reading list	1. Lecture slides (available on moodle.astanait.edu.kz); 2. Clean Code: A Handbook of Agile Software Craftsmanship 1st Edition by Robert C. Martin  3. Head First Design Patterns: A Brain-Friendly Guide [Eric Freeman, Bert Bates, Kathy Sierra, Elisabeth Robson]
8. Resources	Online journals, article, papers, books and internet resources.

9. Course policy	<p><b>Course and university policies include:</b></p> <p><b>Attendance:</b> Students are expected to attend all scheduled class sessions with all required reading and supplementary materials. Readings are to be completed prior to class.</p> <p>The student won't obtain additional points for course attendance, but the attendance is important to pass the course. In case the student is not able to attend the classes for some reasons, he/she must inform the dean's office in advance and the student itself is responsible for learning all materials, which were given during unattended lessons.</p> <p>In case if <b>the student did not attend more than 20% of the classes</b> without any reasonable excuses, the teacher has a right to mark him as "not graded", and the student wouldn't be admitted to the exam. In other words, students must participate in at least 80% of all class time, otherwise he/she fails the course.</p> <p><b>Preparation for Class:</b> Class participation is a very important part of the learning process in this course. Although not explicitly grade, students will be evaluated on the QUALITY of their contributions and insights. Quality comments possess one or more of the following properties:</p> <ul style="list-style-type: none"> <li>- Offers a different and unique, but relevant, perspective;</li> <li>- Contributes to moving the discussion and analysis forward;</li> <li>- Builds on other comments.</li> </ul> <p><b>Class work:</b> The duration of each lecture and practical lesson is 50 minutes. Students are expected to complete all readings and assignments ahead of time, attend class regularly and participate in class discussions. In case of systemic student's misconduct, the student would be dispensed from the classes.</p> <p><b>Being late on class:</b> When students come to class late, it can disrupt the flow of a lecture or discussion, distract other students, impede learning, and generally erode class morale. Moreover, if left unchecked, lateness can become chronic and spread throughout the class. By the policy of this course, students who come late to class for more than 5 minutes are not allowed to get in to class and consequently, they will be marked as "absent" for the specific hour.</p>
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**Home work / Assignments:** The assignments are designed to acquaint students with the theoretical knowledge and practical skills required for the course. The textbook readings will be supplemented with materials collected from recent professional articles and journals. In case of using someone's work (papers, articles, any publications), all works must be properly cited. Failure to cite work will be resulted as a cheating from the students and may be a subject of additional disciplinary measures.

**Late assignments:** Most assignments will be discussed in class on the due date, therefore late assignments will not receive credit. It is expected that all work will be submitted on time. Failure to pass assignments in on time will result in 0% for the assignment. In other words, no late submissions are allowed. All gradings are based using a percentage grading scale.

*In the event of some extraordinary event, students should notify the teacher and request an extension of the deadline. If approved, a new date will be given to the student depending upon the circumstances.*

**Final exam:** The final exam for the course "Software Design Patterns" is a final project. Each student will have 10-15 minutes to defend his / her project. The project materials must be submitted in the Learning Management System ([moodle.astanait.edu.kz](http://moodle.astanait.edu.kz)). No late submissions are allowed in the exam.

**Laptops and mobile devices** can only be used for classroom purposes when directed by the teacher. Misuse of laptops or handheld devices will be considered a breach of discipline and appropriate action will be initiated by the teacher.

**Cheating and plagiarism** are defined in the Academic conduct policies of the university and include:

1. Submitting work that is not your own papers, assignments, or exams;
2. Copying ideas, words, or graphics from a published or unpublished source without appropriate citation;
3. Submitting or using falsified data;
4. Submitting the same work for credit in two courses without prior consent of both instructors.

Any student who is found cheating or plagiarizing on any work for this course will receive 0 (zero) for that work and further actions will also be taken regarding academic conduct policies of the university.

	<p><b>Academic Conduct Policies of the university:</b> The full texts of all the academic conduct code will be posted to the students using the learning management system (moodle.astanait.edu.kz).</p> <p><b>Contacting the Instructor (Teacher):</b> The easiest and the most reliable way to get in touch with the teacher is by email. Students must feel free to send emails if they have a question related to the course. The teacher will respond as soon as he can but not always instantaneously. Besides that, students are also welcome to arrange one-to-one meeting with the teacher during office hours to discuss the class.</p>
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### 3. Course Content

#	Abbreviation	Meaning
1	TSIS	Teacher-supervised independent work
2	SIS	Students' independent work
3	IP	Individual project
4	PA	Practical assignment
5	LW	Laboratory work
6	MCQ	Multiple choice quiz

#### 3.1.Lecture, practical/seminar/laboratory session plans

Week No	Course Topic	Lecture (H/W)	Practic e session s (H/W)	Lab. sessi ons (H/W)	TSI S (H/W)	SIS (H/W)
1	Introduction to the course and policies Setting up the environment. Git flow Introduction to the SOLID principles	0	5	0	1	9
2	Creational design patterns	0	5	0	1	9
3	Creational design patterns	0	5	0	1	9
4	Structural design Patterns	0	5	0	1	9

5	Structural design Patterns. Midterm week	0	5	0	1	9
6	Behavioral design patterns	0	5	0	1	9
7	Behavioral design patterns	0	5	0	1	9
8	Software architecture examples. MVC, MVVM, MVP	0	5	0	1	9
9	Project Week. Preparation part	0	5	0	1	9
10	Endterm. Project defense	0	5	0	1	9
	<b>Total hours: 150</b>	<b>0</b>	<b>50</b>	<b>0</b>	<b>10</b>	<b>90</b>

### 3.2.List of assignments for Student Independent Study

<b>№</b>	<b>Assignments (topics) for Independent study</b>	<b>Hours</b>	<b>Recommended literature and other sources (links)</b>	<b>Form of submission</b>
1	2	3	4	5
1	1. Git flow 2. Single-responsibility principle 2. Open–closed principle 3. Liskov substitution principle 4. Interface segregation principle 5. Dependency inversion principle	10	Books, internet resources	Exercises
2	Creational design patterns	10	Books, internet resources	Exercises
3	Creational design patterns	10	Books, internet resources	Exercises
4	Structural design Patterns	10	Books, internet resources	Exercises

5	Structural design Patterns	10	Books, internet resources	Exercises
6	Behavioral design patterns	10	Books, internet resources	Exercises
7	Behavioral design patterns	10	Books, internet resources	Exercises
8	Software architecture examples. MVC, MVVM, MVP	10	Books, internet resources	Exercises
9	Project Week	10	Books, internet resources	Exercises
10	Project Week	10	Books, internet resources	Exercises

#### 4. Student performance evaluation system for the course

Period	Assignments	Number of points	Total
1 <sup>st</sup> attestation	<b>Assignments:</b> Assignment 1 Assignment 2 <b>Mid term</b>	20 20 <b>60</b>	100
2 <sup>nd</sup> attestation	<b>Assignments:</b> Assignment 3 Assignment 4 Assignment 5 <b>Project</b>	10 15 15 <b>60</b>	100
Final exam	<b>Written exam</b>		100
<b>Total</b>	<b><math>0,3 * 1^{st} \text{ Att} + 0,3 * 2^{nd} \text{ Att} + 0,4 * \text{Final}</math></b>		<b>100</b>

Achievement level as per course curriculum shall be assessed according to the evaluation chart adopted by the academic credit system.

Letter Grade	Numerical equivalent	Percentage	Grade according to the traditional system
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A	4,0	95-100	Excellent
A-	3,67	90-94	
B+	3,33	85-89	Good
B	3,0	80-84	
B-	2,67	75-79	
C+	2,33	70-74	
C	2,0	65-69	Satisfactory
C-	1,67	60-64	
D+	1,33	55-59	
D	1,0	50-54	
FX	0	25-49	Fail
F	0	0-24	

## 5. Methodological Guidelines

Assessment is administered continuously throughout the course. The students are rated against their performance in continuous rating administered throughout the semester (60%) and summative rating done during the examination session (40%), total 100%. Continuous rating is students' on-going performance in class and independent work. Class work is assessed for attendance, laboratory works' defense and in- class assessments.

- **TSIS (Teacher Supervised Student Independent Study)** -comprises presentation to be done by students independently and checked by instructor.
- **Mid-term and End-term** is a review of the topics covered and assessment of each student's knowledge. The form of the midterm and endterm exams is complex.
- **Final assessment** for the course “Software Design Patterns” is a final project. Each student will have 10-15 minutes to defend his / her project. The project materials must be submitted in the Learning Management System ([moodle.astanait.edu.kz](http://moodle.astanait.edu.kz)). No late submissions are allowed in the exam.