General information	**Title and code of subject, number of credits**	EENG245 Software Engineering 3 credits/6ECTS	
	Department	Physics and Electronics	
	Program	**Master**	
	Academic semester	2022 spring	
	Lecturer	Assosiate Prof. Guliyev Mazahim	
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	Phone number:	+994 55567 70 74	
	Lecture room/Schedule	11 Mehseti Street, AZ1096 Baku, Azerbaijan (Neftchilar campus), room	
	Consultations	Saturday 13:00 – 14:00	
Course language	English		
Type of the subject	Major		
Textbooks and additional materials	***Textbooks*:** 1. Ian Sommerville, Software Engineering, Addision and Wesley.2004 2. Pankaj Jalote, An integrated approach to Software Engineering by Springer 2007 3. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill. 2016		
Teaching methods	**Lecture**		15
	Group discussions at seminars		15
Assessment	**Components**	**Date/ Deadline**	**Percent (%)**
	Active participation	At each lesson	5
	Quizzes	During the semester	20
	Attendance		5
	Midterm exam		30
	Final exam		40
	Final		**100**
Course outline	Successful software development depends on an in-depth understanding of how the phases and supporting activities of the software development life cycle work together. Each phase of the life cycle contributes to a reliable, maintainable product that satisfies user requirements. The application of good engineering practices throughout the cycle dramatically improves the likelihood of delivering a quality software project on time, in scope and within budget. While there are many rigorous methodologies, in fact most approaches and tools have a mixture of strengths and weaknesses. Traditional development approaches result in models that are incomplete and quickly become outof-sync with the application source code. Many modeling approaches focus on describing software designs, rather than solving business problems. This course presents modern software engineering techniques and examines the software life-cycle, including software specification, design, implementation, testing and maintenance. The course evaluates past and current trends in software development practices including agile software development methods such as Extreme Programming (XP), Agile Modeling (AM), Scrum, ASD, DSDM, Crystal, Feature Driven Development (FDD), Incremental Funding Method (IFM), DevOps, and Site Reliability Engineering. Agile software processes, DevOps, and SRE are the most recent trends in the software industry and promise strong productivity improvements, increased software quality, higher customer satisfaction and reduced developer turnover. Agile development techniques empower teams to overcome time-to-market pressures and volatile requirements. The course gives an overview of methods and techniques used in agile software processes, contrasts agile approaches with traditional software development methods, and discuss the sweet spots of both classes of methodologies. Other non-agile approaches that are widely used in industry such as the Rational Unified Process (RUP) and the Open Process Framework (OPF) will also be covered. Process improvement initiatives such as the Capability Maturity Model (CMM) and Personal Software Process (PSP) will be discussed.		
Course objectives	The Aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects. Topics include process models, software requirements, software design, software testing,• software process/product metrics, risk management, quality management and UML diagrams		
Learning	Ability to translate end-user requirements into system and software requirements, using e.g. UML, and		

outcomes	structure the requirements in a Software Requirements Document (SRD). Identify and apply appropriate software architectures and patterns to carry out high level • design of a system and be able to critically compare alternative choices. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
Rules (Educational policy and behavior)	Lesson organization General information on the subject will be provided for the students during lectures. Student's knowledge on the previous topics will be evaluated and new topic will be explained by mins of visual aids during seminars. Student's knowledge level will be tested oraly and in written forms before midterm and final exams. Submission of the individual works by the end of course is obligatory. Attendance Participation of students at all classis is important. Students should inform dean's office about missing lessons for particular reasons (illness, family issues and etc.). Students, missing more than 25% of lessons, are not allowed to take the exam. Lates Those students who are late for lessons for more than 15 minutes are not allowed to participate at the lesson. Despite this, the student is allowed to take part in the second part of the lesson. Quizzes Those students who have informed the teacher and the dean's office about missing the quiz in advance for particular reasons, are allowed to take the quiz next week. Exams All the issues related to the participation and admission to the exam are regulated by the faculty dean. Topics of midterm and final exams are provided for the students before the exams. The questions of midterm exam are not repeated in the final exam. Violation of the rules of the exams Disrupting the quiz and taking copy during midterm and final exams is forbidden. Quiz papers of the student who do not follow these rules are canceled and the students are expelled from the quiz by getting 0 (zero). The rule for completing the course In accordance with the University rules the overall success rate to complete the course should be 60% or above. The students who failed the exam would be to take this subject next semester or next year. Rules of conduct for Students Disruption of the lesson and not following ethical norms during the lesson, as well as conduction of the discussions by the students without permission and using mobile phones is forbidden.

This program reflects the comprehensive information about the subject and information about any changes will be provided in advance.

Week	Dates (planned)	Subject topics	Textbook/ Assignments
1		*Software process Models and lifecycle* Software Product, Product, Software Processes, Evolving Role of Software, Software: A Crisis on the Horizon and Software Myths, Software Engineering: A Layered Technology,	[2] p. 2-16
2		*Software process Models and lifecycle* Study of different Software Process Models, The Linear Sequential Model, The Prototyping Model, The RAD Model, Evolutionary Process Models, Component-Based Development, Process, Product and Process, Object Oriented Software Engineering	[1] p. 4-20 [1] p.30-52 [1] p. 24-28 [1] p. 67-81
3		*Project Management Concepts & Project Metrics:* The Management Spectrum, People, Product, Process, Project, The W5HH Principle, Metrics in the Process and Project Domains (FP & LOC), Software Measurement, Metrics for Project and Software Quality	[2] p. 31-57 [2] p. 76-85
4		*Software Project Planning, Scheduling and Tracking:* Project Planning Objectives, Software Project Estimation using COCOMO Model, Software Scope and Resources, Empirical Estimation Models, Automated Estimation Tools, Basic Concepts and Relationship Between People and Effort, Defining a Task Set for the Software Project, Selecting Software Engineering Tasks, Defining a Task Network and Scheduling, Earned Value Analysis and Error Tracking	[2] p. 113-146 [2] p. 153-155
5		*Software Requirements Specification:* Requirement Gathering and Analysis, Software Requirement Specification(SRS), Formal requirements specification and verification - axiomatic and algebraic specifications	[1] p. 216-240 [3] p. 124-148

		Quiz 1(Lec1-Lec4)	[1] p. 242-251
6		***Public holiday***	
7		*Analysis Modeling, SoftwareDesign Concepts and Principles:* The Elements of the Analysis Model, Data Modeling, Functional Modeling and Information Flow, Behavioral Modeling and Structured Analysis, Software Design and Software Engineering, The Design Process, Design Principles, Design Concepts, Modular Design, Design Heuristics for Effective Modularity	[2] p. 173-198 [2] p. 201-208 [2] p. 201-208
8		*Analysis Modeling, SoftwareDesign Concepts and Principles:* The Design Model ,Design Documentation, Function oriented v/s object-oriented design, Object Modeling using UML, Software Architecture and Data Design, Architectural Styles, Analyzing Alternative Architectural Designs, Mapping Requirements into a Software Architecture ***Quiz 2(Lec5-Lec6)***	[2] p. 271-300 [2] p. 310-314
9		***Mid term exam***	
10		*User Interface Design, Component Level Design:* User Interface Design, Task Analysis and Modeling, Interface Design Activities and Implementation Tools, Design Evaluation, Structured Programming and Comparison of Design Notation	[2] p. 384-422 [2] p. 425-427
11		*Risk Analysis & Management:* Reactive versus Proactive Risk Strategies, Software Risks (Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation), Risks Monitoring and Management	[2] p. 565-588 [2] p. 596-600
12		*Coding, Software Testing Techniques & Software Testing Strategies:* Software Testing Fundamentals and Test Case Design, White-Box Testing and Black-Box Testing, ISO/IEC/IEEE Software Testing standards, Testing for Specialized Environments, A Strategic Approach to Software Testing and Issues, Unit Testing, Integration and Validation Testing, System Testing,Software Documentation and Debugging Techniques ***Quiz 3(Lec9-Lec10)***	[2] p. 602-635 [2] p. 667-693 [2] p. 636-638 [2] p. 694-698
13		*Software Quality Assurance and Configuration Management:* Quality Concepts and Software Quality Assurance, Quality Planning and Control, Software Reviews (Formal Technical Reviews), Software Reliability and Fault Tolerance, The ISO 9000 Quality Standards, The SCM Process, Identification of Objects in the Software Configuration, Six Sigma, Version Control and Change Control	[2] p. 764-788 [2] p. 801-805
14		*Emerging and advanced topics in Software Engineerin:* Security Engineering, Agile Methods, Client Server Software Engineering, Aspect Oriented Software Development, Software Engineering Aspects of Programming Languages, Reverse Engineering, Re-engineering, Web Engineering, CASE.	[2] p. 807-825 [2] p. 845-850
15		***Recap of all covered material*** ***Quiz 4(Lec11-Lec13)***	
		Final Exam