



Universitas Negeri Surabaya
Faculty of Engineering,
Mechanical Engineering Education Undergraduate Study Program

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																																				
Quality Control Techniques	8320302180	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	6	January 10, 2023																																																																																																				
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																																					
	Wahyu Dwi Kurniawan, S.Pd., M.Pd.		Wahyu Dwi Kurniawan, S.Pd., M.Pd.			Ir. Wahyu Dwi Kurniawan, S.Pd., M.Pd.																																																																																																					
Learning model	Project Based Learning																																																																																																										
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																																										
	PLO-10	Have an understanding of mathematics and basic mechanical engineering																																																																																																									
	Program Objectives (PO)																																																																																																										
	PO - 1	Students have good morals, ethics and personality when attending lectures																																																																																																									
	PO - 2	Students have knowledge about the influence of quality on modern business, quality control tools and acceptance sampling according to developments in science and technology to control product quality in industry																																																																																																									
	PO - 3	Students have the skills to draw and analyze control charts to control product quality in industry.																																																																																																									
	PO - 4	Students are able to interact and work together in teams, be responsible, think logically and intelligently in solving problems faced professionally in the field of machining engineering.																																																																																																									
	PLO-PO Matrix																																																																																																										
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Short Course Description	This course contains the influence of quality on modern business, quality control tools, control charts and acceptance sampling.																																																																																																										
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	1. Douglas, C. Montgomery. 1990. Pengantar Pengendalian Kualitas Statistik. Gajah Mada University Pres., Yogyakarta. 2. Praptono. 1985. Statistika Pengawasan Kualitas. Penerbit Karunika Jakarta. Universitas Terbuka.																																																																																																										
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Supporting lecturer	Ir. Wahyu Dwi Kurniawan, S.Pd., M.Pd. Bima Anggana Widhiarta Putra, S.Pd., M.Pd.																																																																																																										

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students are able to explain their understanding of the meaning of quality, the influence of technology and quality assurance methods.	Accuracy in: 1. Explaining the meaning of quality; 2. Explain quality as the key to business success; 3. Explain the effect of an effective quality assurance program on increasing market penetration and productivity as well as reducing costs4. Explain the relationship between technological development and new product development, competition and quality.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * 2x50	* Lecture, * Discussion, * 2x50	Material: Meaning of quality, quality assurance, technology and productivity References: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	5%
2	Students are able to explain their understanding of statistical quality control.	1. Explain the statistical methods used in quality control2. Explain the benefits that can be gained by statistical quality control.	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Tests	* Lecture, * Discussion, * 2x50	* Lecture, * Discussion, * 2x50	Material: Statistical quality control techniques and their benefits Reference: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	5%
3	Students are able to explain their understanding of quality control tools.	Accuracy in: 1. Explaining how to make and the benefits of checking sheets; 2. Explain how to make and the benefits of a histogram; 3. Explain how to make and the benefits of a Pareto diagram; 4. Explain how to make and the benefits of a cause and effect diagram; 5. Explain how to make and the benefits of a defect concentration diagram; 6. Explain how to make and the benefits of scatter diagrams.	Criteria: Accuracy in the use of quality control devices Form of Assessment : Participatory Activities, Tests	* Lecture, * Discussion, * Exercise, * Assignment: Analyze product quality using quality control tools * 2x50	* Lecture, * Discussion, * Exercise, * Assignment: Analyze product quality using quality control tools * 2x50	Material: Quality control tools References: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	5%
4	Students are able to explain their understanding of variable control charts.	1. Accuracy in: 1. Calculating the control limits of the X and R maps; 2. Draw X and R maps; and 3. Analyze the X and R maps. 2. Accuracy in: 1. Calculating the control limits of the X and R maps; 2. Draw X and R maps; and 3. Analyze the X and R maps.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Exercise, * Assignment: Analyzing product quality using variable control charts * 2x50	* Lecture, * Discussion, * Exercise, * Assignment: Analyzing product quality using variable control charts * 2x50	Material: Variable control chart Reference: <i>Praptono. 1985. Quality Control Statistics. Karunika Publisher Jakarta. Open University.</i>	15%

5	Students are able to explain their understanding of rational grouping and group control charts.	<p>1. Accuracy in: 1. Explaining two ways of grouping according to production sequence; 2. Calculate control limits for group control charts; 3. Draw a group control chart; 4. Analyze the group control chart.</p> <p>2. Accuracy in: 1. Explaining two ways of grouping according to production sequence; 2. Calculate control limits for group control charts; 3. Draw a group control chart; 4. Analyze the group control chart.</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Tests</p>	<p>* Lecture, * Discussion, * Exercise, * Assignment: Analyze product quality using group control charts * 2x50</p>	<p>* Lecture, * Discussion, * Exercise, * Assignment: Analyze product quality using group control charts * 2x50</p>	<p>Material: Group control chart Reference: <i>Eugene L. Grant and Richards Leavenworth.1988. Statistical Quality Control. Erlangga Publishers. Jakarta.</i></p>	5%
6	Students are able to explain their understanding of X, sigma control charts for large groups and for individual measurements.	<p>1. Accuracy in: 1. Calculating control chart control limits X, large group sigma; 2. Draw a control chart X, large group sigma; 3. Calculate control chart control limits for individual measurements; 4. Draw control charts for individual measurements.</p> <p>2. Accuracy in: 1. Calculating control chart control limits X, large group sigma; 2. Draw a control chart X, large group sigma; 3. Calculate control chart control limits for individual measurements; 4. Draw control charts for individual measurements.</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities, Tests</p>	<p>* Lecture, * Discussion, * Exercise, * Assignment: Analyzing product quality using X, sigma control charts for large groups and for individual measurements. * 2x50</p>	<p>* Lecture, * Discussion, * Exercise, * Assignment: Analyzing product quality using X, sigma control charts for large groups and for individual measurements. * 2x50</p>	<p>Material: Control chart of X, σ for large groups and for individual measurements. Reference: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i></p>	10%
7	Students are able to explain their understanding of process capability analysis.	<p>Accuracy in: 1. Explaining the meaning of process capability analysis; 2. Analyze process capabilities using histograms; 3. Analyze process capabilities using control charts.</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities</p>	<p>* Lecture, * Discussion, * Practice, * 2x50</p>	<p>* Lecture, * Discussion, * Practice, * 2x50</p>	<p>Material: Process capabilities References: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i></p>	5%

8	Midterm Exam (UTS).	Compliance with the answer key	Criteria: Compliance with the answer key. Form of Assessment : Test	Midterm Exam (UTS). * 2x50	Midterm Exam (UTS).	Material: Meeting material 1 to 7 References: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	10%
9	Students are able to explain their understanding of attribute control charts.	Accuracy in: 1. Calculating the p map control limits; 2. Draw a p map; 3. Calculate control limits of map c; 4. Draw a control chart c.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Exercise, * Assignment: Analyzing product quality using attribute control charts * 2x50	* Lecture, * Discussion, * Exercise, * Assignment: Analyzing product quality using attribute control charts * 2x50	Material: Attribute control chart Reader: <i>Praptono. 1985. Quality Control Statistics. Karunika Publisher Jakarta. Open University.</i>	5%
10	Students are able to explain their understanding of single acceptance sampling.	1. Accuracy in: 1. Explaining how to carry out single sampling; 2. Calculate the probability of acceptance (Pa); 3. Draw the operating characteristic curve (KO); 4. Calculate expected damage in lots (AOQ); 5. Calculate average total inspection (ATI) 2. Accuracy in: 1. Explaining how to carry out single sampling; 2. Calculate the probability of acceptance (Pa); 3. Draw the operating characteristic curve (KO); 4. Calculate expected damage in lots (AOQ); 5. Calculate average total inspection (ATI)	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Exercise, * Assignment: Calculate acceptance probability (Pa) using single acceptance sampling * 2x50	* Lecture, * Discussion, * Exercise, * Assignment: Calculate acceptance probability (Pa) using single acceptance sampling * 2x50	Material: Single admission sampling Reference: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	5%
11	Students are able to explain their understanding of designing a single sampling plan.	Accuracy in: 1. Explain how to determine n and c using a certain KO curve; 2. Explain how to determine n and c using nomography.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Exercise, * Assignment: Determine n and c using a single sampling plan. * 2x50	* Lecture, * Discussion, * Exercise, * Assignment: Determine n and c using a single sampling plan. * 2x50	Material: Designing a single sampling plan Reference: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	4%
12	Students are able to explain their understanding of multiple acceptance sampling.	Accuracy in: 1. Explaining how to carry out double sampling; 2. Calculate the probability of acceptance (Pa) for multiple sampling; 3. Explain the KO curve in double sampling.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Practice, * Assignment: Calculate acceptance probability (Pa) using multiple acceptance sampling * 2x50	* Lecture, * Discussion, * Practice, * Assignment: Calculate acceptance probability (Pa) using multiple acceptance sampling * 2x50	Material: Multiple acceptance sampling Reference: <i>Praptono. 1985. Quality Control Statistics. Karunika Publisher Jakarta. Open University.</i>	3%

13	Students are able to explain their understanding of designing multiple sampling plans.	Accuracy in: 1. Explain how to determine n_1 , n_2 and c_1 , c_2 when $n_1 = n_2$ using the Grubbs table; 2. Explain how to determine n_1 , n_2 and c_1 , c_2 when $n_2 = 2n_1$ using the Grubbs table.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Practice, * Assignment: Calculate acceptance probability (Pa) using multiple acceptance sampling * 2x50	* Lecture, * Discussion, * Practice, * Assignment: Calculate acceptance probability (Pa) using multiple acceptance sampling * 2x50	Material: Designing a double sampling plan Reference: <i>Praptono. 1985. Quality Control Statistics. Karunika Publisher Jakarta. Open University.</i>	5%
14	Students are able to explain their understanding of the MIL STD 105 D sampling standard.	Accuracy in: 1. Explaining procedures for standard sampling MIL STD 105 D; 2. Determine the sample size and acceptance number for a certain number of products, in a single sampling; 3. Determine the sample size and acceptance number for a certain number of products, in double sampling.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Exercise, * Assignment: Analyze product samples using standard sampling MIL STD 105 D. * 2x50	* Lecture, * Discussion, * Exercise, * Assignment: Analyze product samples using standard sampling MIL STD 105 D. * 2x50	Material: Sampling standard MIL STD 105 D. References: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	5%
15	Students are able to explain their understanding of the Dogde-Roaming sampling system.	Accuracy in: 1. Explaining Dodge Roaming system procedures; 2. Determine the sample size and sampling acceptance number using the Dodge Roaming system.	Criteria: Assessment rubric Form of Assessment : Participatory Activities	* Lecture, * Discussion, * Practice, * Assignment: Analyze product samples using Dogde-Roaming sampling * 2x50	* Lecture, * Discussion, * Practice, * Assignment: Analyze product samples using Dogde-Roaming sampling * 2x50	Material: Sampling Dodge - Roaming Bibliography: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	3%
16	Final Semester Examination (UAS)	Compliance with the answer key	Criteria: Compliance with the answer key Form of Assessment : Test	Final Semester Examination (UAS) * 2x50	Final Semester Examination (UAS) * 2x50	Material: Meeting material 1 to 15 References: <i>Douglas, C. Montgomery. 1990. Introduction to Statistical Quality Control. Gajah Mada University Pres., Yogyakarta.</i>	10%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	67.5%
2.	Test	32.5%
		100%

Notes

- Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
- The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
- Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
- Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
- Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
- Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
- Forms of assessment:** test and non-test.
- Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
- Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.

