

MINISTRY OF HIGHER EDUCATION AND SCIENTIFIC RESEARCH

«SALAHADDIN UNIVERSITY – ERBIL (SUE)»

COLLEGE OF ENGINEERING

AVIATION ENGINEERING DEPARTMENT



Subject «Flaw detection and non-destructive methods of control
of aircraft and aircraft engine»

Fall Semester

Class: 2nd stage

Lecturer: Dr. Heersh S.A.

B. Sc. In Aerospace Engineering.

M. Sc. In Flight-Type Engines.

PhD. In Aviation and Rocket-
Space Technology.

Heersh.ahmed@su.edu.krd

Erbil 2023 -2024

Syllabus

1. Course name	Flaw detection and non-destructive methods of control of aircraft and aircraft engine
2. Lecturer in charge	Dr. Heersh Saleem Ahmed
3. Department/ College	Aviation Engineering Department / College of Engineering
4. Contact	e-mail: heersh.ahmed@su.edu.krd Tel: 07504492302
5. Time (in hours) per week	Theory: 3 Practical: 2
6. Office hours	4 hours
7. Course code	9041
8. Teacher's academic profile	- B.Sc. In Aerospace Engineering, Russia, 2014. - M.Sc. in Flight-Type Engines, Russia, 2016. - PhD. In Aviation and Rocket-Space Technology from Kazan National Research Technical University named after A.N. Tupolev – KAI, Kazan - Russia, 2021. - Laboratory assistant (Turbojet engine TJ-100A-Z), Kazan National Research Technical University named after A.N. Tupolev – KAI, Russia, 2017 - 2021.
9. Keywords	Flaw detection, non-destructive methods, control of aircraft, aircraft engine.
10. Course overview:	Maintenance non-destructive testing (NDT) is the most economical way of performing inspection and this is the only way of discovering defects. In simply we can say, NDT can detect cracks or any other irregularities in the airframe structure and engine components, which are obviously not visible to the naked eye.
11. Course objective:	Ensuring the quality of products of enterprises in various spheres of human life has been and continues to be the main and main task of all industries. A special place is occupied by ensuring the reliability and safe operation of techno-genic objects of increased danger, which include objects of aviation, space and rocket technology.
12. Student's obligation	The students are asked to attend al the lectures and they should arrive on time to the class and that is their responsibility to find out what assignment to be made when they are absent. They should active participation in the class for their successes. The student must participate in all quizzes and exams. He has to present all the homework at the required time.
13. Forms of teaching	Using a whiteboard tool to cover in details all the required explanation and data show.
14. Assessment scheme	<ul style="list-style-type: none"> - 20% Quizzes, Seminar, Report & Activity - 20% Practical - 20% Mid-term exam - 40% Final theoretical exam
15. Student learning outcome:	As a result of studying the discipline, the student will study: <ul style="list-style-type: none"> - General concepts of non-destructive testing and their place in modern systems of technical maintenance and repair; - Volumetric and surface defects that occur in the details of aircraft construction and signs and patterns of destruction;

<ul style="list-style-type: none"> - General principles of modern maintenance and repair methods in connection with the use of technical diagnostics and NC methods; - Diagnostic signs of defects and malfunctions of aircraft parts; - Methods of detecting defects in materials; - Physical foundations of acoustic, radiation, electromagnetic, defectoscopy methods; - Physical foundations of capillary, optical and other methods of flaw detection. 	
<p>16. Course Reading List and References:</p> <ul style="list-style-type: none"> - Kosarina E. I., Krupnina O. A., Stepanov A. V. X-ray methods of non-control. — Moscow: Sven, 2019. — 385 p. [in Russian]. - Moghanlou, M.R.; Khonsari, M.M. On the kinetic formulation of fracture fatigue entropy of metals. <i>Fatigue Fract. Eng. Mater. Struct.</i> 2022, 45, 565–577. - Kraljevski, I.; Duckhorn, F.; Tschöpe, C.; Wolff, M. Machine Learning for Anomaly Assessment in Sensor Networks for NDT in Aerospace. <i>IEEE Sens. J.</i> 2021. 	
17. The Topics:	Lecturer's name
<p>week 1: General concepts of Non-destructive testing (NDT) methods</p> <p>week 2: Technical diagnostics</p> <p>week 3: Application in modern maintenance</p> <p>week 4: Repair systems of aviation equipment</p> <p>week 5: Object condition criteria</p> <p>week 6: Classification of defects</p> <p>week 7: Patterns of malfunctions</p> <p>week 8: Defects and failures</p> <p>week 9: Diagnostic signs</p> <p>week 10: Basic principles of NDT of materials</p> <p>week 11: Principles of NDT of materials products</p> <p>week 12: Classification of methods</p> <p>week 13: The main types of NDT</p> <p>week 14: Diagnostic of parameters</p> <p>week 15: Tools for checking aircraft engine</p>	<p>Heersh Saleem Ahmed</p>
18. Practical Topics	
<ul style="list-style-type: none"> - Completion of Preliminary Work and Laboratory Analysis. - Demonstrated understanding of physical phenomena. - All lecture material up to the date of the test. - Understanding of application of theoretical diagnostic to real world device. - All course content from weeks 1-15 inclusive. 	
<p>19. Examinations: All relative topics in both theory, the student has to finish the entire requirement to meet the syllabus.</p>	

20. Extra notes:

The students should support themselves be able to solve and design project daily by them and not neglect the subject.

21. Peer review:

Attendance at all theory and laboratory experiments to which you are assigned is compulsory and a register is taken. If you are unable to attend, due to illness, it is important that you inform the head demonstrator as soon as possible so that you may be reassigned to a later experiment.