



Department of Aviation
College of Engineering
University of Salahaddin
Subject: Aircraft Propulsion.
Course Book – *Second Stage*
Lecturer name:
Dr. Ali Issa Sulaiman
Academic Year: 2023/2024

Course Book

1. Course name	Aircraft Propulsion
2. Lecturer in charge	Dr. Ali Issa Sulaiman
3. Department/ College	Engineering /Aviation Department
4. Contact	e-mail: Ali.sulaiman.su.edu.krd
5. Time (in hours) per week	6 hours in a Week
6. Office hours	Two days at the week
7. Course code	
8. Teacher's academic profile	<p>Ali Issa Sulaiman: PhD of Aircraft Engines, Kazan National Research Technical University named after A. N. Tupolev – KAI, Kazan-Russia, 2020</p> <p>From 2021 to present working as one of the faculty members in our college, He have been taught for the First and Second stage from that date till now.</p>
9. Keywords	Aircraft, Propulsion, Engine, efficiency, Inlet, LPC, HPC, CC, HPT, LPT, Nozzle, Turbojet, Turbofan, Turboprop, Turboshaft
10. Course overview:	<p>Thus, the present course provides a comprehensive description of the whole design process from the conceptual stages to the final integration of the propulsion system into the aircraft. The structure of this course is tailored to the special needs of teaching design and therefore should contribute greatly to the learning of the design process that is the crucial requirement in any aeronautical engineering curricula. At the same time, the wealth of design information in this course and the comprehensive accompanying software will provide useful information for aircraft engine designers.</p> <p>.</p>
This course is organized essentially along three main themes:	<ol style="list-style-type: none"> 1) The Design Process 2) Engine calculation and engine selection 3) Engine Components and types. 4) Engine maintenance
12. Student's obligation	<p>Here the students should;</p> <p>They have to attend the lectures.</p> <p>Listen to the Teacher and participation.</p> <p>They have to submit the Reports or present their presentations or projects.</p>
13. Forms of teaching	<p>The staff will use;</p> <p>Data show to explain the lectures and different seminars.</p> <p>Draw on the whiteboard.</p> <p>Giving a hard soft copy for the lectures in order to be easy for them to read and study.</p>

14. Assessment scheme

20% activity

10% practical

20% mid-term exam

15% final practical exam

35% final theoretical Exam

15. Student learning outcome:

On completion of this course students should be able to:

- 1- Learn a brief history of the development of aircraft engines
- 2- Distinguish types of aircraft engines
- 3- Recognize types of gas turbine engine, their differences
- 4- Explain the principle of work of gas turbine engine
- 5- Describe the components of gas turbine engine and their tasks
- 6- Will be familiarized with the aerodynamic and gas-dynamic calculation of the entire engine
- 7- learn how to service and maintain the aircraft propulsion.

16. Course Reading List and References:

- 1-Nicholas, C. Andrew, H. 2015. Jet Propulsion: A Simple Guide to the Aerodynamics and Thermodynamic Design and Performance of Jet Engines. 3rd ed. UK: Cambridge University Press.
- 2-Saeed Farokhi. 2014. Aircraft Propulsion. 2nd edition. The University of Kansas. USA.
- 3-Saeed, F. 2021. Aircraft Propulsion: Cleaner, Leaner, and Greener. 3rd ed. NY: Wiley.
- 4-Mattingly, J.D., Heiser, W.H., and Pratt, D.T.2002, Aircraft Engine Design, 2nd edition, AIAA, Washington, DC.
- 5- Cumpsty, N., Jet Propulsion: A Simple Guide to the Aerodynamic and Thermodynamic Design and Performance of Jet Engines, 2nd edition, Cambridge University Press, Cambridge, UK, 2003.
- 6-L.N.V.M. Society Group of Institutes. 2007. Aero engines. School of Aeronautics. Dwarka, New Delhi – 45. First Edition 2007.

- 7- Rolls-Royce plc. 1986. The jet engine. Fifth edition. England. ISBN 0902121 235.
- 8- Jack D. Mattingly, William H. Heiser, David T. Pratt. 2002. Aircraft engine design. 2nd ed.
- 9- Aeropool. 2017. Aircraft maintenance manual. Pages marked as “easa approved” are approved by European Aviation Safety Agency.
- 10- Meherwan P. Boyce. 2006. Gas Turbine Engineering Handbook. Third Edition. ISBN 0-88415-732-6. Library of Congress Cataloging-in-Publication Data. USA.
- 11- Reaction Engines Ltd website: [www.reactionengines](http://www.reactionengines.co.uk) .co.uk (last accessed 7 December 2013)
- 12- Hill, P.G. and Peterson, C.R., Mechanics and Thermodynamics of Propulsion, 2nd edition, Addison-Wesley, Reading, MA, 1992.
- 13- Pratt & Whitney, Geared Turbo Fan. http://www.pw.utc.com/PurePowerPW1000G_Engine; last accessed 24 November 2013.
- 14- Hileman, J.I., Ortiz, D.S., Bartis, J.T., *et al.*, “Near-Term Feasibility of Alternative Jet Fuels,” Technical Report, Rand Corporation, Santa Monica, CA, 2009.
- 15- Wisler, D.C., “Advanced Compressor and Fan Systems,” UTSI Short course notes on Aero-Propulsion Systems, April 2000.
- 16- Schobeiri, M.T., Turbomachinery Performance and Flow Physics, Springer Verlag, New York, 2005.

THE WEBSITES OF NASA AND MAJOR AIRCRAFT ENGINE MANUFACTURERS ARE LISTED FOR REFERENCE

www.hq.nasa.gov

www.grc.nasa.gov

www.pw.utc.com

www.pwc.ca

www.ge.com

www.mtu.de

www.rolls-royce.com

www.sneema.com
www.enginealliance.com
www.cfm56.com
www.geae.com
www.V2500.com
www.williams-int.com

17. The Topics: Theoretical Subjects	Lecturer's name
<p>Week 1. Course book</p> <p>Week 2. Classification of aircraft propulsion</p> <p>Week 3. Principle of working and engine cycle of GTE (Turbojet, turbofan, turboshaft and turboprop)</p> <p>Week 4. Engine components</p> <p>Week 5. Engine inlets and Fan</p> <p>Week 6. Low and high pressure Compressor</p> <p>Week 7. Combustion chamber</p> <p>Week 8. Midterm exam</p> <p>Week 9. High and low pressure turbine</p> <p>Week 10. Nozzle, reverse and thrust</p> <p>Week 11. Inner and outer shafts Fuel and lubricant systems</p> <p>Week 12. The start mode of aircraft engine (starting and ignition), Material of engine components</p> <p>Week 13. Engine safety and anti-ice system (fire and ice protection)</p> <p>Week 14. Engine life and Engine maintenance</p> <p>Week 15. The piston engines</p>	<p>Dr. Ali Issa Sulaiman</p>