University of Puerto Rico
Mayagüez Campus
College of Engineering
Department of Mechanical Engineering
Bachelor of Science in Mechanical Engineering

Course Syllabus

1. General Information:

Alpha-numeric codification: INME 4709
Course Title: Aircraft Performance
Number of credits: 3
Contact Period: Three hours of lecture per week

2. Course Description:

English: Study of performance and design characteristics of conventional aircraft using atmospheric properties, and the concepts of lift and drag. Design for specified flight conditions and the flight conditions for best performance using the physical characteristics of an aircraft. Analysis of level flight performance, rates of climb, service and absolute ceilings, range, take-off and landing, and turn performance.

Spanish: Estudio del rendimiento y características del diseño de aeronaves convencionales usando las propiedades atmosféricas y los conceptos de elevación y resistencia. Diseño para condiciones de vuelo especificado y condiciones de vuelo para el mejor rendimiento usando características físicas de una aeronave. Análisis del rendimiento de vuelo nivelado, razón de elevación, servicio y alturas absolutas, rango, despegue y aterrizaje y rendimiento del viraje del avión.

3. Pre/Co-requisites and other requirements:

Prerequisites: (INGE 3032 or INGE 3035) and (MATE 4009 or MATE 4145) and INGE 3016

4. Course Objectives:

Upon successful completion, students will be able to:

- Determine how fluid dynamic affects aircraft performance;
- Use concepts of lift and drag to compute aircraft performance;
- Examine the applications of level flight performance such as rates of climb, service and absolute ceilings, endurance, range, take-off and landing, and turn performance;
- Formulate and analyze longitudinal and lateral stability.
- Carry out a preliminary design of an airplane.

5. Instructional Strategies:

☒conference ☒discussion ☒computation ☐laboratory

☒seminar with formal presentation ☐seminar without formal presentation ☐workshop

☐art workshop ☒practice ☐trip ☐thesis ☒special problems ☒flipped classroom

☒research ☒other, please specify: Design Project

6. Minimum or Required Resources Available:

General Library, CadLab, Mechanical Engineering Department Library.

7. Course time frame and thematic outline

General Topics	Contact Hours
Aerodynamics of the airplane: The drag polar	6
Review of propulsion characteristics	6
Airplane performance in level flight: minimum velocity, rate of climb, time to climb, range, endurance	10
Airplane performance in accelerated flight: level turn, V-n diagram, take-off and landing.	10
Airplane design	10
Test	3
Total hours: (equivalent to contact period)	**45**

8. Grading System

☒Quantifiable (letters) ☐ Not Quantifiable

9. Evaluation Strategies

	Quantity	Percent
☒ **Exams**	**2**	**50**
☒ **Final Exam**	**1**	**25**
☒ **Short Quizzes**	**4**	**10**
☐ **Oral Reports**		
☐ **Monographies**		
☐ **Portfolio**		
☒ **Projects**	**1**	**15**
☐ **Journals**		
☒ **Other, specify: Homework**	**5**	**0**
TOTAL:		**100%**

10. Bibliography:

Textbook:

Anderson, John D, Jr, *Aircraft Performance and Design, 2002*, McGraw-Hill, New York, NY.
Copy at the University's General Library

Other references:

- Anderson, John D, Jr, *Fundamentals of Aerodynamics*, Fourth Edition, McGraw-Hill, New York, NY. Copy at the University's Library
- Anderson, John D, Jr, *Introduction to Flight*, 2002, Fourth Edition, McGraw-Hill, New York, NY. Copy at the University's Library
- Phillips, W. F., *Mechanics of Flight*, 2004, John Wiley & Sons, New York, NY
- Dole, C. E. and Lewis, J. E., *Flight Theory and Aerodynamics*, 2000, John Wiley & Sons, New York, NY

11. Law 51: The Comprehensive Educational Services Act for People with Disabilities:
States that after identifying with the instructor and the institution, the student with disabilities will receive reasonable accommodation in their courses and evaluations. For more information, contact the Department of Counseling and Psychological services at the Office of the Dean of Students (Office DE 21) or call 787-265-3864 or 787-832-4040 x 3772, 2040 and 3864.

12. Academic Integrity
The University of Puerto Rico promotes the highest standards of academic and scientific integrity. Article 6.2 of the UPR Students General Bylaws (Board of Trustees Certification 13, 2009-2010) states that academic dishonesty includes, but is not limited to: fraudulent actions; obtaining grades or academic degrees by false or fraudulent simulations; copying the whole or part of the academic work of another person; plagiarizing totally or partially the work of another person; copying all or part of another person answers to the questions of an oral or written exam by taking or getting someone else to take the exam on his/her behalf; as well as enabling and facilitating another person to perform the aforementioned behavior. Any of these behaviors will be subject to disciplinary action in accordance with the disciplinary procedure laid down in the UPR Students General Bylaws.─

13. Certification 06-43 of the Academic Senate
"The academic guidelines for offering online courses," defines: Traditional face-to-face courses are those that have less than 25% of the course's regular contact hours via the Internet. Therefore, a three-credit course will be considered "face to face" if, of the 45 hours of regular contact, 11 or less are taught via the Internet. According to certification 06-43 of the Academic Senate, a course may include up to 25% of its total contact hours via the Internet. The objective of this is so that all professors have this alternative in the case of any unscheduled eventuality.

14. Sexual Harassment: Certification 130-2014-2015 states:
Sexual harassment in the workplace and in the study environment is an illegal and discriminatory act and is against the best interests of the University of Puerto Rico. All persons who understand they have been subject to acts of sexual harassment at the University of Puerto Rico may file a complaint and request that the institution investigate, where necessary, and assume the corresponding action by the university authorities. If the complainant is a student, he or she must refer his or her complaint to the Office of the Student Ombudsperson or that of the Dean of Students.

Revised: February, 2019