

**INTRODUCTION TO
AERONAUTICAL
ENGINEERING
2020-1**

I. INFORMACIÓN GENERAL

CURSO	INTRODUCTION TO AERONAUTICAL ENGINEERING
CLAVE	ING339
CRÉDITOS	3.5
HORAS DE DICTADO	CLASE: 3 Semanal LABORATORIO: EXAMEN:
HORARIO	TODOS
PROFESORES	CARLOS SAITO VILLANUEVA

II. PLANES CURRICULARES DONDE SE DICTA EL CURSO

ESPECIALIDAD	ETAPA	NIVEL	CARÁCTER	REQUISITOS
INGENIERÍA ELECTRÓNICA	PREGRADO EN FACULTAD	0	ELECTIVO	Cred.en Especialidad : 110.00
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Tipos de requisito

- 04 = Haber cursado o cursar simultaneamente
- 05 = Haber aprobado o cursar simultaneamente
- 06 = Promedio de notas no menor de 08
- 07 = Haber aprobado el curso

III. DESCRIPCIÓN DEL CURSO

Aeronautical Engineering is the discipline whose scope is the study, design and manufacture of mechanical devices capable of rising in flight, as well as a set of techniques that allow the control of aircraft. Also handles the driving forces (alternative, turbofan, turbo shaft and turbojet) to build aero structures for the aircraft. Physical science, which is based Aeronautical Engineering is the aerodynamics, which studies the movement and behavior of air when an object moves through this. Also Aeronautical Engineering is also based on fluid mechanics and structural engineering. Other fields of Aeronautical Engineers are airport construction, design and operation of air transportation networks and manufacturing special equipment such as weapons, satellites or rockets.

The course aims to introduce students to research in the aeronautical and aerospace field, exposure to technological advances, to the theory and applications to research and development. The course is designed to link science to engineering basis, addressing fundamental issues of Aeronautical Engineering.

Additionally, it is known that aviation is always at the forefront of technology, as such, is of interest in this course generate research, innovation and development that will serve the student and PUCP to always be at the national forefront of technology and that students possess an additional area where they can test their knowledge and skills.

IV. SUMILLA

FACULTAD DE CIENCIAS E INGENIERÍA
ING339 - INTRODUCTION TO AERONAUTICAL ENGINEERING

Aeronautical Engineering is the discipline whose scope is the study, design and manufacture of mechanical devices capable of rising in flight, as well as a set of techniques that allow the control of aircraft. Also handles the driving forces (alternative, turboprop, turboshaft and turbojet) to build aero structures for the aircraft.

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V. OBJETIVOS

Upon completion of this course the students will be able to:

- Possess basic knowledge of Aeronautical Engineering.
- Meet all key parts of an aircraft and its internal structure.
- Understand the aerodynamic behavior of an object as it moves through the air.
- Understand and calculate the aerodynamic forces generated by an object moving through the air.
- Understand the operation of the surfaces that control movement of an aircraft in flight.
- Understand and calculate performance parameters of an aircraft.
- Know the different types of propulsion systems that are used to move an object through the air.

Also, the students will achieve these results by the end of the course:

- (a) An ability to apply knowledge of mathematics, science, and engineering.
- (b) An ability to design and conduct experiments, as well as to analyze and interpret data.
- (d) An ability to function on multidisciplinary teams.
- (e) An ability to identify, formulate, and solve engineering problems.
- (j) A knowledge of contemporary issues.
- (k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

VI. PROGRAMA ANALÍTICO

SESIÓN 1 . (1 sesiones)

The Atmosphere

- The main characteristics of the atmosphere is described, the principles of the standard atmosphere and why it is a suitable environment where they can develop the flight.

Wind Tunnel

- The main features, principle of operation and type of wind tunnels in the world, and the importance of its use for the development of technology and research will be described.

SESIÓN 2 . (1 sesiones)

Airfoils

- Major aerodynamic characteristics of airfoils, the lift and resistance curves and different types of profiles that exist will be described. The importance of the Reynolds number will be explained. The importance of a viscous flow is explained to determine aerodynamic characteristics of a profile.

SESIÓN 3 . (1 sesiones)

Continuity Equation and Momentum Equation

- The main equations to find aerodynamic characteristics of a body.

SESIÓN 4 . (1 sesiones)

The Airplanes

- Major parts of the aircraft, its operation and importance will be described for a flight. Aircraft are classified into fixed wing and rotary wing, both classifications will be explained.

The Wings

- The particular aerodynamic characteristics of a wing of finite size are described. The general theory of winglets or wingtips and aerodynamic effects are explained.

SESIÓN 5 . (1 sesiones)

Lifting Line Theory

- It is a theory that explains how to calculate numerically the main aerodynamic characteristics of an infinite wing.

SESIÓN 6 . (1 sesiones)

High lift Devices

- Aerodynamic features offered by these devices during different phases of flight will be described. Different types of devices and their operating principle is explained.

SESIÓN 7 . (1 sesiones)

Subsonic Compressible Flow

- Aerodynamic features of flying at compressible speeds.

SESIÓN 8 . (1 sesiones)

Transonic Flow and Shock Wave

- Structural and aerodynamic changes used to minimize the negative effects when flying at transonic speeds are described.

SESIÓN 9 . (1 sesiones)

EXAM N°1

SESIÓN 10 . (1 sesiones)

Rotary Wing Aircraft

- Mechanical and aerodynamic characteristics of these aircraft, utility and operating principle unlike fixed-wing aircraft will be described.

SESIÓN 11 . (1 sesiones)

Propulsion Systems

- Main propulsion systems used in the commercial market and the Unmanned Aircraft Systems will be described.

SESIÓN 12 . (1 sesiones)

Performance

- Curves and the main parameters to be taken into account to maximize the performance of an aircraft are described.

SESIÓN 13 . (1 sesiones)

Performance

- The necessary parameters are described to calculate the best performance of an aircraft during takeoff and landing.

SESIÓN 14 . (1 sesiones)

Stability and Control

- It describes the main characteristics for adequate stability of the aircraft and how they influence the control mechanisms during flight.

SESIÓN 15 . (1 sesiones)

Unmanned Air Systems

- Main characteristics and types, applications, and future developments. Operation and configuration of an autopilot using everything learned during the course.

VII. METODOLOGÍA

The course is theoretical - practical. The methodology is based on exhibitions, class discussions and participation of students to explore course topics. Aerodynamic analysis software were used for the student to observe the behavior of the aerodynamic forces in a practical way. The lectures will be delivered using PowerPoint slides and development exercise on blackboard. Participation of students in practical designs, experimental and construction testing is contemplated.

VIII. EVALUACIÓN

Sistema de evaluación

Nº	Codigo	Tipo de Evaluación	Cant. Eval.	Forma de aplicar los pesos	Pesos	Cant. Eval. Eliminables	Consideraciones adicionales	Observaciones
1	Nf	Nota Unica	1	Por Evaluación	Nf1=1			

Fórmula para el cálculo de la nota final

$$(1Nf1) / 1$$

Aproximación de la nota final No definido

Consideraciones adicionales

Se aplica modalidad de evaluación 4.

IX. BIBLIOGRAFÍA

Referencia obligatoria

- Libro
Abbot and Von Doenhoff
Theory of Wing Sections: Including a Summary of Airfoil Data
Dover Publishing
- Libro
John J. Bertin
2002
Aerodynamics for Engineers
Prentice - Hall
- Libro
Steve A. Brandt, Randall J. Stiles, John J. Bertin y Ray Whitford
2004
Introduction to Aeronautics: A Design Perspective
AIAA
- Página web
XFLR5, Java Foil y plantillas personalizadas.
Software

X. POLÍTICA CONTRA EL PLAGIO

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