



Universidad
Politécnica
de Cartagena



Centro
Universitario
de la Defensa

General Air Force Academy

Course unit description:
Meteorology and Communications
Phraseology

Degree/s: Industrial Organization Engineering Degree

1. Subject data

Name	Meteorology and Communications Phraseology				
Subject area	Meteorology and Communications Phraseology				
Module	Compulsory Subject				
Code	511103009				
Degree programme	Industrial Organization Engineering Degree				
Curriculum	2009 (Decreto 269/2009 de 31 de julio)				
Centre	University Centre of Defense at the Spanish Air Force Academy				
Type	Compulsory				
Length of subject	Four-month course	Semester	1 st	Course	4 th
Language	English				
ECTS	4.5	Hours / ECTS	25	Total workload (hours)	112.5

2. Lecturer data

Lecturer in charge	José Serna Serrano		
Department	Engineering and Applied Techniques		
Knowledge area	Aerospace Engineering		
Office location	Room 28 @ CUD building		
Telephone	+34.968.189927	Fax	+34.968188780
email	jose.serna@ cud.upct.es		
URL / WEB	Virtual website UPCT		
Office hours	Request via Virtual Website		
Location	Room 28 @ CUD building / Virtual classroom		

Qualification/Degree	Aeronautical Engineer. Ph.D. at the Universidad Politécnica de Madrid. (Aerospace Science and Technology Program)
Academic rank at CUD-UPCT	Assistant Professor (Tenure Track) at Associate Center
Year of admission in CUD-UPCT	2012
Number of five-year periods (<i>quinquenios</i>) if applicable	1
Research lines (if applicable)	<ul style="list-style-type: none"> * Experimental Aerodynamics: facilities design, instrumentation and experimental tests. * Boundary layer stability and control: experimental and numerical researches. * Aerodynamic profiles for “low” Reynolds numbers aerodynamics. * Heat Transfer Applications.
Number of six-year periods (<i>sexenios</i>) if applicable	1
Professional experience (if applicable)	<ul style="list-style-type: none"> * Fluid Mechanics Laboratory. School of Aeronautics. UPM (basic and industrial research) > 7 years. * BBVA (Quantitative developer at front desk: equity and FX derivatives valuation). 1 year.
Other topics of interest	UAVs: technology and integration in the air space.

Meteorology Lecturer	Jose Antonio Pellitero Abia		
Department	External. AEMET		
Knowledge area	Air Physics. Meteorology and climatology Renewable energy and energy sustainability		
Office location	Meteorological bureau at the Spanish Air Force Academy Room 10 @ CUD building		
Telephone	968189173	Fax	968189970
email	jpelliteroa@aemet.es		
URL / WEB	Virtual classroom UPCT		
Office hours	Upon request via Virtual Classroom, where additional info will be given prior to the beginning of the course		
Location	Room 10 @ CUD building		

Qualification/Degree	Engineer
Academic rank at CUD-UPCT	External Professor at Associate Center
Year of admission in CUD-UPCT	2017
Number of five-year periods (<i>quinquenios</i>) if applicable	0
Research lines (if applicable)	--
Number of six-year periods (<i>sexenios</i>) if applicable	0
Professional experience (if applicable)	Aeronautical Meteorology <ul style="list-style-type: none"> - San Javier OMD - Huesca OMA Lecturer of Meteorology at CUD-AGA (GIOI) since the course 2017-18.
Other topics of interest	--

Phraseology Lecturer	Major Ryan Woolf		
Department	793 Basic flight instruction squadron.		
Knowledge area	Instrument and visual flight Civil and tactical aviation communications Academic and flight instruction.		
Office location	Air Force Operations Group, Basic Flying Training School.		
Telephone	968189322 (834-2322)	Fax	
email	rwoo-00@ext.mde.es		
URL / WEB	Virtual classroom UPCT		
Office hours	Upon request via Virtual Classroom, where additional info will be given prior to the beginning of the course		
Location	Classroom / Basic flight instruction squadron		

Qualification/Degree	Major of the United States Air Force
Academic rank at CUD- UPCT	External Professor at Associate Center
Year of admission in CUD- UPCT	2017
Number of five-year periods (<i>quinquenios</i>) if applicable	0
Research lines (if applicable)	--
Number of six-year periods (<i>sexenios</i>) if applicable	0
Professional experience (if applicable)	Instructor/Evaluator Pilot with over 2000 flight hours total, 1200 flight instruction hours.
Other topics of interest	--

3. Subject description

3.1. General description

The special features of the Centro Universitario de la Defensa (CUD) placed at the Spanish Air Force Academy (AGA) make it necessary to complement the curriculum of the Organization Engineering Degree with specific courses related to aeronautics. This is due to the environment where the former students will develop their immediate professional activity.

The course "Meteorology and Communications Phraseology" is a compulsory subject within the academic conception of the curriculum. This course is offered to cover the blocks 050 and 090 of the theoretical knowledge requirements for Flight Crew Licenses, according to Joint Aviation Authorities (JAR-FCL 1.470). During the previous three years, the student has acquired the theoretical and practical tools to undertake the study of the Meteorology subject from a quantitative and practical point of view. Additionally, during those three years the students have attended to several courses on English language, knowing the grammatical rules and technological vocabulary. In this course, the special features of the aeronautical jargon and the communications pilot – control are widely studied.

3.2. How the subject contributes to a professional career

Meteorology.

In this course the most important meteorological factors for the flight navigation are presented. To do that, the first chapters explain the basic concepts to understand the meteorological information services. The following chapters are about the most important meteorological phenomena (precipitation, wind, fronts, etc.), and how the teledetection shows them. Finally a summary of the main meteorological hazards for aviation and other phenomena are described.

Communications Phraseology

This course will introduce the basic concepts of effective aviation communication, focusing on specific, standard ICAO and NATO communications procedures and phraseology. The course will build a foundation necessary for the development of a communications skillset that follow-on training programs will build upon, and permit the next generation of aviation warfighter to seamlessly integrate into and operate across the full spectrum of joint and combined operational environments.

3.3. Relationship with other subjects in the programme

To successfully face the course, students should have knowledge of the following subjects:

- Fluid Mechanics (2nd year): pressure, density, state equation, simplified atmospheric models.
- Energetic Technology (2nd year): thermodynamics and heat transfer.
- Environmental Technology (2nd year): atmosphere definition and structure.
- Fundamentals of Flight (3rd year): ISA, atmospheric effects on aerodynamics and aircraft performances.
- English I (1st year): English Language fundamentals (B2 level)

Technological English II (3rd year): aeronautical and military vocabulary.

3.4. Incompatibilities defined in the programme

No incompatibilities have been defined

3.5. Recommendations to do the subject

See section 3.3

3.6. Special provisions

Special measures will be adopted to allow the simultaneity of the course with military and aeronautics training activities. Specifically, working groups will be formed to promote the cooperative learning, promoting the learning track by scheduled tutorships and continuous assessments delivery.

4. Competences and learning outcomes

4.1. Basic curricular competences related to the subject

KC3. Students must have the ability to collect and interpret important data (normally within their area of study) in order to make judgments considering relevant social, scientific or ethical issues.

4.2. General curricular competences related to the subject

GC2. Application of general technologies and fundamental subjects in the industrial domain for the solving of engineering problems.

4.3. Specific curricular competences related to the subject

SC30. Analyze topics applied to engineering and aircraft systems operations.

4.4. Transversal curricular competences related to the subject

CCC4. Effective use of information resources

4.5. Subject learning outcomes

At the end of the course, the student should be able:

1. To identify the most adverse meteorological phenomena a pilot can face while planning a flight route, using the Meteorological Information Systems.
2. To understand the main physical processes that lead to those phenomena.
3. To understand calls, terminology, abbreviations and phraseology related to both ICAO civil and military aviation environments.
4. To learn basic terminology and phraseology that will facilitate effective communications in real-world airborne environments.
5. To learn basic terminology and phraseology that will facilitate effective communication between pilots and air traffic services during abnormal situations and emergencies.

5. Contents

5.1. Curricular contents related to the subject

Atmosphere. Temperature, pressure, density, moisture. Cloud generation and rain. Jets streams, shear and storms. Aeronautical Communications Standards (VFR and IFR) in English language.

5.2. Theory syllabus (teaching modules and units)

PART I. METEOROLOGY

D.U.1. Basic concepts for Meteorological Information Services.

- Lesson 1. Introduction to meteorology.
- Lesson 2. Temperature and humidity.
- Lesson 3. Pressure and density.
- Lesson 4. Visibility.
- Lesson 5. Meteorological Information Services.

D.U.2. Meteorological phenomena applied to flight.

- Lesson 6. Static stability and adiabatic processes.
- Lesson 7. Clouds.
- Lesson 8. Precipitation.
- Lesson 9. Air masses and fronts.
- Lesson 10. Wind.
- Lesson 11. Teledetection.
- Lesson 12. Thunderstorms.
- Lesson 13. Turbulence.
- Lesson 14. Icing.
- Lesson 15. Non-frontal depressions.

PART II. COMMUNICATIONS PHRASEOLOGY

D.U. 3. STANDARD COMMUNICATIONS

- Lesson 16. Introduction
- Lesson 17. Communications General
- Lesson 18. Taxi, ATIS, Airport Abbreviations and Vocabulary
- Lesson 19. Line-up and Takeoff
- Lesson 20. Departure, Climb and Level-Off
- Lesson 21. Enroute and Traffic
- Lesson 22. Descent and Arrival
- Lesson 23. Approach, Landing, and After Landing
- Lesson 24. Midterm Examination
- Lesson 25. Flight Plans and Flight Plan Changes
- Lesson 26. Emergencies and Abnormal Situations
- Lesson 27. Brevity Words and Review
- Lesson 28. Final Examination

5.3. Practice syllabus (name and description of every practical)

Meteorology:

No specific sessions at laboratories or multimedia classroom will be taken. During the theoretical lectures, the lecturer will develop practical exercises to fix the theoretical concepts.

Phraseology. Multimedida classroom.

Due to the listening and speaking requirements inherent in the topic of instruction, the class will take place in a multi-media classroom.

Risk prevention

Promoting the continuous improvement of working and study conditions of the entire university community is one the basic principles and goals of the Universidad Politécnica de Cartagena.

Such commitment to prevention and the responsibilities arising from it concern all realms of the university: governing bodies, management team, teaching and research staff, administrative and service staff and students.

The UPCT Service of Occupational Hazards (*Servicio de Prevención de Riesgos Laborales de la UPCT*) has published a "Risk Prevention Manual for new students" (*Manual de acogida al estudiante en materia de prevención de riesgos*), which may be downloaded from the e-learning platform ("Aula Virtual"), with instructions and recommendations on how to act properly, from the point of view of prevention (safety, ergonomics, etc.), when developing any type of activity at the University. You will also find recommendations on how to proceed in an emergency or if an incident occurs.

Particularly when carrying out training practices in laboratories, workshops or field work, you must follow all your teacher's instructions, because he/she is the person responsible for your safety and health during practice performance. Feel free to ask any questions you may have and do not put your safety or that of your classmates at risk.

5.4. Theory syllabus in english (teaching modules and units)

See Section 5.1.

5.5. Detailed description of learning goals for every teaching module

The table shows the relationship between learning goals (Section 4.5) and teaching modules

		LEARNING GOALS				
		1	2	3	4	5
TEACHING MODULE (D.U)	1	X	X			
	2	X	X			
	3			X	X	X

6. Teaching method

6.1. Teaching method			
Teaching activity	Teaching techniques	Student workload	Hours
Lectures	Explanation of the subject and following of students' acquisition and application. Doubts solution. Special attention on fundamental and most complex aspects will be made.	<u>Attendance</u> : attendance to classes and participation. Notes taking. Questions.	27.5
		<u>Non-attendance</u> : individual subject study.	35.75
Classes	Typical problems resolution and practical cases study with teacher assistance.	<u>Attendance</u> : active attendance. Questions and problems resolution.	6.5
		<u>Non-attendance</u> : individual subject study. Proposed problems resolution.	12.5
Practicals (multimedia classroom)	Explanation, manage and direction of multimedia classroom.	<u>Attendance</u> : Active participation. Notes taking. Questions and practice performance.	11
Continuous assessment	Short theoretical-practical questions will be given to the student to be solved in the classroom (or virtual classroom) as a technique to monitor the learning process.	<u>Attendance</u> : Theoretical-practical problems solution.	1
Workout for oral presentation	Proposals of the workout options and guidance through documentation to develop the work. Evaluation of the oral presentations.	<u>Attendance</u> : Oral presentation and answer to questions.	0.25
		<u>Non-attendance</u> : Individually: material selection and understanding. Oral exposition trials. Groupally: aesthetic and contents coherence of the presentation must be obtained	12.5
Supervisions and group tutorials	Proposed problems revision and students' doubts resolution.	<u>Attendance</u> : Face theoretical and practical doubts.	2
		<u>Non-attendance</u> : Theoretical and practical doubts via e-mail and virtual classroom.	
Course assessment	An individual, partial written examination about the first part of the course will take place at the middle of the term. At the end of the term, a final individual written examination will be done.	<u>Attendance</u> : Written assessment attendance and solution.	3.5
TOTAL			112.5

6.2. Learning outcomes (4.5) / teaching activities (6.1)

Teaching activities (6.1)	Learning outcomes				
	1	2	3	4	5
Lectures	X	X	X	X	X
Classes	X	X			
Practicals			X	X	X
Continuous assessment			X	X	X
Workout for oral presentation			X	X	X
Supervisions and group tutorials	X	X	X	X	X
Course assessment	X	X	X	X	X

7. Assessment method

7.1 Assessment method

Assesment activity	Type		Assessment methods and criteria	Percentage (%)	Assessed learning outcomes (4.5)
	Summative	Formative			
Individual Written Assessment ^(1,2)	X	X	Meteorology Test: 4 options per question with only 1 right answer Each wrong answer deduces 1/3 of the right answer mark 50% to pass	66.6%	1,2
	X	X	Phraseology Final Test (FRAPEIFIN) 50 questions Two parts: listening & multiple choice Lessons 18 to 29	50%·33.3%	3,4,5
	X	X	Phraseology Mid Test (FRAPEIINT) 50 questions Two parts: listenings & multiple choice Lessons 18 to 26	20%·33.3%	3
Oral Presentation ⁽²⁾	X	X	Phraseology Oral (FRAORAL) Each student will take an oral examination with the professor in order to evaluate their capacity to effectively communicate in standard ICAO aviation environments.	30%·33.3%	3,4,5

COMMENTS:

- (1) Only **1 Individual Written Assessment on Meteorology** will be taken. The numerical mark of this part (MET) will be normalized to 0-10 scale. Complementary details can be given at the specif call of the Written Assessment.
- (2) The Phraseology part mark (FRA) will be calculated based on the weighting factors collected at the table, being

$$FRA (0 \text{ to } 10) = 50\%FRAPEIFIN + 20\%FRAPEIINT+30\%FRAORAL$$

- To pass the course both parts must be passed (separately):
 - o Meteorology mark: MET ≥ 5.0 (based on a 0-10 scale)
 - o Phraseology mark : FRA ≥ 5.0 (based on a 0-10 scale)
- The course mark is calculated according to the temporal distribution of the parts:

$$\text{Course} = \frac{2}{3}\text{MET} + \frac{1}{3}\text{FRA}$$

7.2. Control and monitoring methods (optional)

Monitoring will be done by some of the following mechanisms:

- Proposed class questions and cooperative learning activities (with problems).
- Individual tutorials.
- Monitoring of the student activities.
- Individual partial written tests throughout the course.

8. Bibliography and resources

8.1. Basic bibliography

Meteorology

- Meteorology. Edit: Jeppesen. ISBN: 0-88487-451-6
- Meteorología aplicada a la aviación. M. Ledesma y G. Baleirola. Edit: Paraninfo. ISBN: 84-283-2840-4

Phraseology

- ICAO Aeronautical Telecommunications: Annex 10 to the Convention on International Civil Aviation, Volume II, Communication Procedures including those with PANS status. 6th Edition, October 2011.
- ICAO Aeronautical Telecommunications: Annex 11 to the Convention on International Civil Aviation: Air Traffic Services, Chapter 3: Air Traffic Control Service.
- ICAO Doc 4444: Rules of the Air and Air Traffic Services, Part X: Phraseologies.
- APP-7(E) NATO Joint Brevity Words Publication, CHANGE 1, May 2011.
- Fraseología Aeronáutica: Teoría. Escuela Idiomas del Ejército del Aire de España. 1992.
 - Fraseología Aeronáutica: Ejercicios. Escuela Idiomas. Escuela Idiomas del Ejército del Aire de España. 1992.

8.2. Supplementary bibliography

- An introduction to dynamic Meteorology. JR. Holton. Edit: Elsevier Academic Press. ISBN: 0-12-354015-1
- Meteorología para aviadores. Willy Eichenberger. Edit. Paraninfo. ISBN: 84-283-1090-4.
- Meteorología Aeronáutica. B. González. Edit: AVA. ISBN: 84-933720-3-X

8.3. On-line resources and others

Virtual Classroom
Class slideshows