



**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**

**Course: 2016 - 17**

## 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 <sup>st</sup>	Course	4 <sup>th</sup>
Language		English						
ECTS	4.5	Hours / ECTS		25	Total workload (hours)		112.5	

## 2. Lecturer data

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

<b>Teaching and research profile</b>	Aeronautical Engineer. Ph.D. at the Universidad Politécnica de Madrid. (Aerospace Science and Technology Program)
<b>Teaching experience</b>	Taught subjects: Energetic Technology, Fundamentals of flight, Aerodynamics, Avionics and General Aircraft Knowledge.
<b>Research lines</b>	<ul style="list-style-type: none"> <li>* Experimental Aerodynamics: facilities design, instrumentation and experimental tests.</li> <li>* Boundary layer stability and control: experimental and numerical researches.</li> <li>* Aerodynamic profiles for “low” Reynolds numbers aerodynamics.</li> <li>* Heat Transfer Applications.</li> </ul>
<b>Work experience</b>	<ul style="list-style-type: none"> <li>* Fluid Mechanics Laboratory. School of Aeronautics. UPM (basic and industrial research) &gt; 7 years.</li> <li>* BBVA (Quantitative developer at front desk: equity and FX derivatives valuation). 1 year.</li> </ul>
<b>Other</b>	UAVs: technology and integration in the air space.

<b>Meteorology Lecturer</b>	Tomás José Gutiérrez Cobo		
<b>Department</b>	External. AEMET		
<b>Knowledge area</b>	Air Physics. Meteorology and climatology Renewable energy and energy sustainability		
<b>Office location</b>	Meteorological bureau at the Spanish Air Force Academy Room 10 @ CUD building		
<b>Telephone</b>	968189173	<b>Fax</b>	968189970
<b>email</b>	tgutierrezc@aemet.es		

<b>URL / WEB</b>	Virtual classroom UPCT
<b>Office hours</b>	Upon request via Virtual Classroom, where additional info will be given prior to the beginning of the course
<b>Location</b>	Room 10 @ CUD building

<b>Teaching and research profile</b>	Aeronautical Meteorology
<b>Teaching experience</b>	No
<b>Research lines</b>	No
<b>Work experience</b>	Aeronautical Meteorology <ul style="list-style-type: none"> <li>- San Javier OMD</li> <li>- Zaragoza OMA</li> </ul>
<b>Other</b>	

Phraseology Lecturer	Major Bede Bolin		
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	bbol-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		

<b>Teaching and research profile</b>	Flight Instruction Military aviation
<b>Teaching experience</b>	2004 Graduate, T-37B Pilot Instructor Training, Randolph AFB, TX 2004-2006 T-37B Instructor Pilot, Columbus AFB, MS 2008 Graduate, Cessna 172/208 Qualification and Instructor Upgrade, Spartan College of Aeronautics and Technology, Tulsa, OK 2008-2009 Cessna 172 and 208 Instructor Pilot for the Iraqi Air Force, Kirkuk Regional Air Base, Iraq 2010 Graduate, T-38C Pilot Instructor Training, Randolph AFB, TX

	<p>2010-2013 T-38C Pilot Instructor Training Instructor Pilot and Evaluator Pilot, Randolph AFB, TX</p> <p>2012 Advance Instrument School, Air Force Standards Agency, Oklahoma City, OK</p> <p>2014-Present CASA-101 Instructor Pilot and Academic Instructor, Academia General del Aire, San Javier, España</p> <p>FAA Certifications: Flight Instructor, Airplane Single Engine and Instrument Airplane</p>
<b>Research lines</b>	None
<b>Work experience</b>	<p>Instructor/Evaluator Pilot with over 3000 flight hours total, 1800 flight instruction hours.</p> <p>FAA Certifications: Airline Transport Pilot, Airplane Multiengine Land; Certified Flight Instructor, Instrument.</p>
<b>Other</b>	None

### 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 course is divided into 3 blocks. The first one the physical laws that govern these phenomena are presented. Then, the adverse meteorological phenomena (storms, turbulence and visibility) and their hazards for the flight navigation are explained. Finally a summary of the main Meteorological Information Systems is given (aeronautical keys, maps, satellites, numerical models), the knowledge of this system is a key feature for the right flight planning.

##### **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 (2<sup>nd</sup> year): pressure, density, state equation, simplified atmospheric models.
- Energetic Technology (2<sup>nd</sup> year): thermodynamics and heat transfer.
- Environmental Technology (2<sup>nd</sup> year): atmosphere definition and structure.
- Fundamentals of Flight (3<sup>rd</sup> year): ISA, atmospheric effects on aerodynamics and aircraft performances.

- English I (1<sup>st</sup> year): English Language fundamentals (B2 level)  
Technological English II (3<sup>rd</sup> 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

BC1. Students must know and understand a field of study that has its basis in secondary education for which advanced textbooks are used. In addition, students must also be acquainted with avant-garde knowledge of their field of study.

BC2 Students must know how to professionally apply their knowledge to their work or vocation and have the skills to make and defend arguments and solve problems in their field of study.

BC3 Students must have the ability to collect and interpret important data (normally within their area of study) in order to make judgements considering relevant social, scientific or ethical issues.

BC4. Students must be able to transmit information, convey ideas, and describe problems and solutions to a specialised and non-specialised audience.

BC5. Students must have developed the learning abilities needed to undertake subsequent studies with a high degree of autonomy.

### 4.2. General curricular competences related to the subject

01. The ability to organize and manage companies and institutions, evaluating issues related to organizational behaviour and resource management within a secure legal environment based on the students' knowledge of legal aspects.

### 4.3. Specific curricular competences related to the subject

#### PROFESSIONAL COMPETENCES

- ☒ E1.4 Knowledge about applied engineering and aircraft systems, aerospace vehicles, installations and related systems operation.

### 4.4. Transversal curricular competences related to the subject

#### INSTRUMENTAL COMPETENCES

- ☒ T1.1 Analytical and summary skills
- ☒ T1.3 Oral and written communication skills in their mother tongue
- ☒ T1.4 Oral and written communication skills in foreign language

#### PERSONAL COMPETENCES

- ☒ T2.2 Teamwork

#### SYSTEMIC COMPETENCES

- ☒ T3.1 Ability to apply theory to practice
- ☒ T3.2 Learning ability
- ☒ T3.3 Adaptation to new situations
- ☒ T3.7 Ability to work autonomously



#### 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. GENERAL METEOROLOGY**

Lesson 1. Introduction to meteorology.  
Lesson 2. Temperature and humidity.  
Lesson 3. Pressure and density.  
Lesson 4. Static stability and adiabatic processes.  
Lesson 5. Wind.  
Lesson 6. Clouds.  
Lesson 7. Visibility.  
Lesson 8. Precipitation.  
Lesson 9. Air masses and fronts.  
Lesson 10. Non-frontal depressions.

##### **D.U. 2. METEOROLOGY APPLIED TO FLIGHT**

Lesson 11. Turbulence.  
Lesson 12. Thunderstorms.  
Lesson 13. Icing.  
Lesson 14. Teledetection.  
Lesson 15. Meteorological Information Services.

#### **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.

### 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
<b>Lectures</b>	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.	<b>27.5</b>
		<u>Non-attendance</u> : individual subject study.	<b>35.75</b>
<b>Classes</b>	Typical problems resolution and practical cases study with teacher assistance.	<u>Attendance</u> : active attendance. Questions and problems resolution.	<b>6.5</b>
		<u>Non-attendance</u> : individual subject study. Proposed problems resolution.	<b>12.5</b>
<b>Practicals (multimedia classroom)</b>	Explanation, manage and direction of multimedia classroom.	<u>Attendance</u> : Active participation. Notes taking. Questions and practice performance.	<b>11</b>
<b>Continuous assessment</b>	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.	<b>1</b>
<b>Workout for oral presentation</b>	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.	<b>0.25</b>
		<u>Non-attendance</u> : Individually: material selection and understanding. Oral exposition trials. Groupally: aesthetic and contents coherence of the presentation must be obtained	<b>12.5</b>
<b>Supervisions and group tutorials</b>	Proposed problems revision and students' doubts resolution.	<u>Attendance</u> : Face theoretical and practical doubts.	<b>2</b>
		<u>Non-attendance</u> : Theoretical and practical doubts via e-mail and virtual classroom.	
<b>Course assessment</b>	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.	<b>3.5</b>
<b>TOTAL</b>			<b>112.5</b>

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

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			
<b>Individual Written Assessment</b> <sup>(1,2,)</sup>	X	X	<b>Meteorology Test:</b> 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	<b>Phraseology Final Test (FRAPEIFIN)</b> 50 questions Two parts: listening & multiple choice Lessons 18 to 29	50%·33.3%	3,4,5
	X	X	<b>Phraseology Mid Test (FRAPEIINT)</b> 50 questions Two parts: listenings & multiple choice Lessons 18 to 26	20%·33.3%	3
<b>Oral Presentation</b> <sup>(2)</sup>	X	X	<b>Phraseology Oral (FRAORAL)</b> 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

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

- To pass the course both parts must be passed (separately):
  - o Meteorology mark:  $\text{MET} \geq 5.0$  (based on a 0-10 scale)
  - o Phraseology mark :  $\text{FRA} \geq 5.0$  (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