



**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: 2014 - 15

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		

Teaching and research profile	Aeronautical Engineer. Ph.D. at the Universidad Politécnica de Madrid. (Aerospace Science and Technology Program)
Teaching experience	Taught subjects: Energetic Technology, Fundamentals of flight, Aerodynamics, Avionics and General Aircraft Knowledge.
Research lines	<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.
Work experience	<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	UAVs: technology and integration in the air space.

Meteorology Lecturer	Fermín Hernández Morales		
Department	External. AEMET		
Knowledge area	Air Physics. Meteorology and climatology		
Office location	Meteorological bureau at the Spanish Air Force Academy Room 10 @ CUD building		
Telephone	968189905	Fax	968188780
email	fhernandezm@aemet.es		
URL / WEB	Virtual website		

Office hours	
Location	Room 10 @ CUD building

Teaching and research profile	Aeronautical Meteorology
Teaching experience	Courses: Aeronautical Meteorology. Place: main Military Base of the Airmobile Forces of the Spanish Army (FAMET) in Colmenar Viejo (Madrid). 6 academic years.
Research lines	
Work experience	<p>Aeronautical Meteorology</p> <ul style="list-style-type: none"> - main Military Base of the Airmobile Forces of the Spanish Army (FAMET) in Colmenar Viejo (Madrid) - OTAN Main Base in Bétera (Valencia) - Morón de la Frontera Airbase - Gando Airbase - Torrejón de Ardoz Airbase - Los Llanos Airbase <p>Aeronautical predictor in the European Balloons Championship</p>
Other	

Phraseology Lecturer	Major Bede Bolin		
Department	Flights. Basic flight instruction squadron.		
Knowledge area	Instrumental and Visual Flight Aeronautical civil and tactical communications		
Office location	Air Force Building. Basic flight instruction squadron.		
Telephone	968189131	Fax	968188780
email			
URL / WEB	Virtual classroom UPCT		
Office hours	After lectures or under request		
Location	Classroom / Basic flight instruction squadron		

Teaching and research profile	Flight Instruction Military aviation
Teaching experience	<ul style="list-style-type: none"> - Previously qualified pilot instructor in 5 different aircraft - Previous Pilot Instructor Training (PIT) Instructor - Graduate from Pilot Instructor Training (PIT), Randolph AFB, in 2003 and 2010
Research lines	None

Work experience	<ul style="list-style-type: none"> - Pilot Instructor for student pilots in 4 different aircraft; including training positions in the United States Air Force, the Iraqi Air Force, and the Spanish Ejército del Aire. - Responsible for all aspects of flying, ground, and academic training during 4 different flying training assignments.
Other	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

The course will focus on standard radio calls used in various phases of flight. Additionally, emphasis will be placed on vocabulary and abbreviations found in flight related publications.

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

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 and abbreviations related to the flight.
4. To communicate intentions and orders between pilots and air traffic controllers
5. To identify abbreviations and requirements for the documents needed to prepare visual and instrumental flights.

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. Density.

Lesson 3. Temperature and moisture.

Lesson 4. Wind.

Lesson 5. Static stability and adiabatic processes.

Lesson 6. Visibility.

Lesson 7. Cloudiness.

Lesson 8. Pressure systems.

Lesson 9. Rainfalls.

D.U. 2. METEOROLOGY APPLIED TO FLIGHT

Lesson 10. Air masses and fronts.

Lesson 11. Turbulence.

Lesson 12. Storms.

Lesson 13. Icing.

Lesson 14. Climatology

Lesson 15. Meteorological Information Services.

Lesson 16. Teledetection.

Lesson 17. Numerical models and weather prediction.

PART II. COMMUNICATIONS PHRASEOLOGY

D.U. 3. STANDARD COMUNICACIONES

Lesson 18. Departure Information

Lesson 19. Taxi and Take-off

Lesson 20. Standard VFR (uncontrolled field) pattern calls

Lesson 21. Departure and Cruise

Lesson 22. Descent and Approach

Lesson 23. Transition to Tower, Landing and After Landing

D.U.4. FAIL CASE ACTIONS

Lesson 24. Traffic alerts, NORDO, and other Emergencies

D.U.5. COMUNICACIONES AVIATION SAFETY CASE STUDIES

Lesson 25. Case study. Los Rodeos

Lesson 26. Case study. Providence Rhode Island Runway Incursion

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.

For a better practice of the communication procedures between pilot and control, the multimedia classroom will be used for real communications listening sessions and simulated speaking sessions.

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
	4			X	X	X
	5			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) (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			
Individual Written Assessment ^(1,2,3)	X	X	Meteorology Test: 30 questions (approx) 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 Test: 55 questions 75% right questions to pass	25.05%	3,4,5
Continuous Assessment ⁽²⁾	X	X	Eventually problems or questions will be given to evaluate the student continuous learning.	1.67%	3,4,5
Oral Presentation ⁽³⁾	X	X	Exposition of a workout about a flight security incident or an own experience. The student must explain the main causes and the lessons related to the exposition	6.68%	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.
- (3) The Individual Written Assessment on Phraseology will be divided into 3 parts:
 - Part 1 → 11 listening questions.
 - Part 2 → Matching questions
 - Part 3 → Multiple Choice questions

The listening questions will have a higher weight than the multiple choice questions, and the multiple choice questions will have a higher weight than the matching questions.

- To pass the course both parts must be passed (separately):
 - Meteorology mark: MET ≥ 5.0 (based on a 0-10 scale)
 - 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).
- Monitoring and review of the proposed 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

- Communications. Oxford Aviation Training 2nd Edition. Edit: Jeppesen.
- Air Speak: Radiotelephony Communication for Pilots
 - Air Speak Radio Recordings

8.2. Supplementary bibliography

- An introduction to dynamic Meteorology. JR. Holton. Edit: Elsevier Academic Press. ISBN: 0-12-354015-1
- Mesoscale Meteorology in Midlatitudes. P.Markowski y Y. Richardson. Edit: John Wiley & Sons. ISBN: 978-0-470-74213-6
- Meteorología Aeronáutica. B. González. Edit: AVA. ISBN: 84-933720-3-X

8.3. On-line resources and others

Virtual Classroom
Class slideshows