



COURSE: Modern Theory of Detection and Estimation

DEGREE:

YEAR: 3rd

TERM: 1st

*La asignatura tiene 29 sesiones que se distribuyen a lo largo de 14 semanas. Los laboratorios pueden situarse en cualquiera de ellas.
Semanalmente el alumnos tendrá dos sesiones, excepto en un caso que serán tres*

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	GROUPS (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Indicate YES/NO If the session needs 2 teachers	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS			DESCRIPTION	CLASS HOURS	HOMEWOR HOURS (Max. 7h week)
1	1	Course overview Block 0 – Introduction to statistical learning <ul style="list-style-type: none"> Decision and estimation concepts Application examples Analytical methods Prerequisites 	X				Random variable and calculus review Reading to be determined	1,6	5
1	2	<ul style="list-style-type: none"> Review problems regarding integral calculus and random variables 		X			Problems to be determined	1,6	
2	3	Block 1 – Analytic estimation <ul style="list-style-type: none"> A general overview of estimation problems Optimal estimation. Bayesian estimation. MSE, MAD, MAP estimation 	X				Reading to be determined Review of the discussed concepts	1,6	6
2	4	<ul style="list-style-type: none"> Estimation problems 		X			Problems to be determined	1,6	

3	5	<ul style="list-style-type: none"> • ML estimation • Estimation involving Gaussian-distributed variables 	X				Reading to be determined Review of the discussed concepts	1,6	6
3	6	<ul style="list-style-type: none"> • ML estimation problems • Problems involving Gaussian-distributed variables 		X			Problems to be determined	1,6	
4	7	<ul style="list-style-type: none"> • Constrained estimation • Minimum mean-square error linear estimation • Linear estimation problems 	X				Reading to be determined Review of the discussed concepts	1,6	6
4	8	<ul style="list-style-type: none"> • Lab session 1: Regression • Data analysis. Training and test. General procedure. 		X	Computer Lab		Previous work about the lab topic	1,6	
5	9	<ul style="list-style-type: none"> • Linear and semi-linear minimum mean-square error regression 	X				Reading to be determined Review of the discussed concepts	1,6	6
5	10	<ul style="list-style-type: none"> • Lab session 2: Regression 		X	Computer Lab		Previous work about the lab topic	1,6	
6	11	<ul style="list-style-type: none"> • Linear estimation 	X				Reading to be determined Review of the discussed concepts	1,6	6
6	12	<ul style="list-style-type: none"> • Lab 3: Regression 		X	Computer Lab		Previous work about the lab topic	1,6	
7	13	Block 2 – Analytic decision <ul style="list-style-type: none"> • General overview of the decision problem • Bayesian decider • MAP and ML deciders 	X				Reading to be determined Review of the discussed concepts	1,6	6
7	14	<ul style="list-style-type: none"> • Block 1 exam (1,25 points) 		X			Problems to be determined	1,6	
8	15	<ul style="list-style-type: none"> • Binary decision: LRT test • Binary decider performance 	X				Reading to be determined Review of the discussed concepts	1,6	6
8	16	<ul style="list-style-type: none"> • Binary and multiclass decision 		X			Problems to be determined	1,6	
9	17	<ul style="list-style-type: none"> • Binary decision 	X				Reading to be determined Review of the discussed concepts	1,6	6
9	18	<ul style="list-style-type: none"> • Lab session 4: Classification • Decider design. General procedure. • Training and test sets. Generalization. • Machine classification. Examples. 		X	Computer Lab		Previous work about the lab topic	1,6	
10	19	<ul style="list-style-type: none"> • Non-Bayesian deciders • Binary decision 	X				Reading to be determined Review of the discussed concepts	1,6	6
10	20	<ul style="list-style-type: none"> • Lab session 5: Data classification 		X	Computer Lab		Previous work about the lab topic	1,6	
11	21	<ul style="list-style-type: none"> • Binary decision 	X				Reading to be determined Review of the discussed concepts	1,6	6
11	22	<ul style="list-style-type: none"> • Lab session 6: Data classification 		X	Computer Lab		Previous work about the lab topic	1,6	
12	23	<ul style="list-style-type: none"> • Block 2 exam (1,25 points) 	X				Reading to be determined Review of the discussed concepts	1,6	6

12	24	• Lab session 7: Exam		X	Computer Lab		Previous work about the lab topic	1,6	
13	25	Block 3 – Time series filtering • Introduction to time series filtering • Optimal linear filtering: Wiener filter	X				Reading to be determined Review of the discussed concepts	1,6	5
13	26	• Lab session 8: Wiener filter		X	Computer Lab		Previous work about the lab topic	1,6	
14	27	• Steepest descent algorithm • Adaptive filtering. Motivation. • LMS filter	X				Reading to be determined Review of the discussed concepts	1,6	
14	28	• Lab session 9: Adaptive filtering		X	Computer Lab		Previous work about the lab topic	1,6	5
	29	• Lab session 10: Exam		X	Computer Lab		Previous work about the lab topic	1,6	3

Subtotal 1

48,33

83

Total 1 (Hours of class plus student homework hours between weeks 1-14)

131,33

15		Tutorials, handing in, etc							
16		Assessment						3	
17									
18									20

Subtotal 2

3

Total 2 (Hours of class plus student homework hours between weeks 15-18)

23

TOTAL (Total 1 + Total 2. <i>Maximum 180 hours</i>)								154.33	
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