Course Programme MVE136 Random Signals Analysis, 7.5 credits, 1st quarter Fall 2014

Teachers: Patrik Albin (Lectures 1-10, written exam), email palbin@chalmers.se.
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Course web-page: http://www.math.chalmers.se/Stat/Grundutb/CTH/mve136/1415/

Responsible university unit: Department of Mathematical Statistics, Mathematica Sciences, Chalmers Tvärgata 3. Expedition: Monday-Friday 9 am-1 pm.

Literature. *S.L. Miller and D.G. Childers: Probability and Random Processes With Application to Signal Processing and Communications, 2004*, available from Cremona Chalmer's bookshop as well as electronically from Chalmers Library. A new second edition of the book has been published Spring 2012 which can equally well be used by students: Besides the addition of more exercises to the 2012 edition, the differences between the two editions are essentially of a typographical nature. In all course material references will be given to the 2004 edition first and then to the 2012 edition afterwards within parenthesises (whenever there is a difference to the 2004 edition). Included material from the book by Miller and Childers: Sections 2.1-2.7 (2.1-2.8 in the second edition), 3.1-3.5, 4.1-4.8, 5.1-5.9, 8.1-8.6, 9.1-9.3, 10.1-10.4 and 11.1-11.6.

Lecture notes "Complement on Digital Spectral Analysis and Optimal Filtering: Theory and Exercises" authored by Mats Viberg, available through the course web-page. Two laborations available through the course web-page. Test exam available through the course web-page.

Examination. Written exam (6 credits) 29 October 2014 pm with reexams 5 January 2015 pm and 17 August 2015 pm. Two mandatory laborations (1.5 credits), see the course web-page.

Permitted aids on the written exam are either two A4-sheets (4 pages) of hand-written notes (xerox-copies and/or computer print-outs are not allowed) or Beta (but not both these aids). The written exam will have 6 tasks that are worth 5 points each. Of the maximal total 30 points you need 12 points for grade 3, 18 points for grade 4 and 24 points for grade 5, respectively.

Lectures take place in room EA according to the following schedule

Lectures	**Day**	**Time**	**Programme**
Lecture 1	Tuesday 2 September	10-11.45 am	Ch. 3 in Miller and Childers' book
Lecture 2	Wednesday 3 September	8-9.45 am	Ch. 4 in Miller and Childers' book
Lecture 3	Tuesday 9 September	10-11.45 am	Ch. 5 in Miller and Childers' book
Lecture 4	Wednesday 10 September	8-9.45 am	Ch. 8 in Miller and Childers' book
Lecture 5	Tuesday 16 September	10-11.45 am	Ch. 8 in Miller and Childers' book
Lecture 6	Wednesday 17 September	8-9.45 am	Ch. 9 in Miller and Childers' book
Lecture 7	Wednesday 24 September	8-9.45 am	Ch. 9 in Miller and Childers' book
Lecture 8	Friday 26 September	8-9.45 am	Ch. 10 in Miller and Childers' book
Lecture 9	Tuesday 30 September	10-11.45 am	Ch. 11 in Miller and Childers' book
Lecture 10	Wednesday 1 October	8-9.45 am	Ch. 11 in Miller and Childers' book
Lecture 11	Friday 3 October	8-9.45 am	Lecture notes
Lecture 12	Tuesday 7 October	10-11.45 am	Lecture notes
Lecture 13	Wednesday 8 October	8-9.45 pm	Lecture notes
Lecture 14	Tuesday 14 October	10-11.45 am	Lecture notes

Consultations that offer help (e.g., with the laborations) take place in room EA 8-9.45 am Tuesday 16 September, Monday 29 September and Tuesdays 30 September, 7 October and 14 October.

Solved exercises. Detailed solutions are available from the course homepage for the problems listed below. Students are advised to study these solutions before working with the home exercises for own work. References are given to the 2004 edition of Miller and Childers's book first and to the 2012 edition afterwards within parenthesises. Stared exercises are non-mandatory extra material.

Course segment	**Exercises**
Chapters 3 in Miller and Childers	Exercises 3.3* (3.12), 3.4 (3.13), 3.7* (3.16), 3.10 (3.21), 3.16 (3.36), 3.17* (3.37)
Chapters 4 in Miller and Childers	Exercises 4.13 (4.29), 4.15 (4.25), 4.20* (4.38), 4.22 (4.40), 4.31 (4.53)
Chapters 5 in Miller and Childers	Exercises 5.22 (5.51), 5.28* (5.56)
Chapters 8 in Miller and Childers	Exercises 8.5 (8.9), 8.7 (8.11), 8.11 (8.15), 8.14* (8.18), 8.22* (8.33), 8.23 (8.34), 8.27 (8.37)
Chapters 9 in Miller and Childers	Exercises 9.5 (9.22), 9.9 (9.12), 9.11 (9.14)
Chapters 10 in Miller and Childers	Exercises 10.8 (10.11), 10.12* (10.15), 10.14* (10.19), 10.19 (10.23)
Chapters 11 in Miller and Childers	Exercises 11.10 (11.5), 11.11 (11.6), 11.14 (11.9), 11.26 (11.34)
Lecture notes	Exercises 1, 3*, 4, 5*, 6, 8*

Home exercises. The following exercises are recommended to students as home exercises for own work. References are given to the 2004 edition of Miller and Childers's book first and then to the 2012 edition afterwards within parenthesises. Stared exercises are non-mandatory extra material.

Course segment	**Exercises**
Chapters 3 in Miller and Childers	Exercises 3.5 (3.14), 3.9 (3.20), 3.14 (3.35), 3.19* (3.46)
Chapters 4 in Miller and Childers	Exercises 4.3 (4.90), 4.4* (4.91), 4.17 (4.35), 4.23 (4.41), 4.28 (4.50), 4.36* (4.62)
Chapters 5 in Miller and Childers	Exercises 5.5 (5.10), 5.29 (5.30), 5.32* (5.60) Test exam Task 1
Chapters 8 in Miller and Childers	Exercises 8.8 (8.12), 8.9 (8.13), 8.12 (8.16), 8.19 (8.20), 8.25* (8.35), 8.28 (8.41), Test exam Task 2
Chapters 9 in Miller and Childers	Exercises 9.2 (9.9), 9.8 (9.23), 9.17 (9.25), 9.26* (9.19) Test exam Task 3
Chapters 10 in Miller and Childers	Exercises 10.5 (10.8), 10.7* (10.10), 10.10 (10.13), 10.17 (10.21 a), 10.20* (10.24), Test exam Task 4
Chapters 11 in Miller and Childers	Exercises 11.1 (11.1), 11.5* (11.14), 11.12 (11.7), 11.17 (11.12), 11.20* (11.22), Test exam Task 5
Lecture notes	Exercises 2, 7 and 9, Test exam Task 6

Exercise supervisions mainly intended to offer help with the exercises (but also possibly other help) take place in room EA Tuesday 8-9.45 am week 2 and Fridays 10-11.45 am week 2-7 according to the following schedule.

Exercises	**Day**	**Programme**
Exercise 1	Tuesday 9 September	Chapters 3 and 4 in Miller and Childers' book
Exercise 2	Friday 12 September	Chapters 5 and 8 in Miller and Childers' book
Exercise 3	Friday 19 September	Chapter 8 and 9 in Miller and Childers' book
Exercise 4	Friday 26 September	Chapter 9 and 10 in Miller and Childers' book
Exercise 5	Friday 3 October	Chapter 11 in Miller and Childers' book
Exercise 6	Friday 10 October	Lecture notes
Exercise 7	Friday 17 October	Lecture notes