Course Programme MVE136 Random Signals Analysis, 7.5 credits, 1st quarter Fall 2012

Teachers: Patrik Albin (Lectures 1-10 and written exam), email `palbin@chalmers.se`.
Lennart Svensson (Lectures 11-14 and Laborations 1-2), email `lennart.svensson@chalmers.se`.
Maryam Fatemi (consultations and exercise supervision), email `maryam.fatemi@chalmers.se`.

Course web-page: `http://www.math.chalmers.se/Stat/Grundutb/CTH/mve136/1213/`

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.

Examination. Written exam (6 credits) 25 October 2012 pm with reexams 17 January 2013 pm and August 2013. 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 4 September	10-11.45 am	Ch. 2 in Miller and Childers' book
Lecture 2	Wednesday 5 September	8-9.45 am	Ch. 3 in Miller and Childers' book
Lecture 3	Tuesday 11 September	10-11.45 am	Ch. 4 in Miller and Childers' book
Lecture 4	Wednesday 12 September	8-9.45 am	Ch. 5 in Miller and Childers' book
Lecture 5	Tuesday 18 September	10-11.45 am	Ch. 8 in Miller and Childers' book
Lecture 6	Wednesday 19 September	8-9.45 am	Ch. 8 in Miller and Childers' book
Lecture 7	Tuesday 25 September	10-11.45 am	Ch. 9 in Miller and Childers' book
Lecture 8	Wednesday 26 September	8-9.45 am	Ch. 9-10 in Miller and Childers' book
Lecture 9	Tuesday 2 October	10-11.45 am	Ch. 11 in Miller and Childers' book
Lecture 10	Wednesday 3 October	8-9.45 am	Ch. 11 in Miller and Childers' book
Lecture 11	Friday 5 October	8-9.45 am	Lecture notes
Lecture 12	Tuesday 9 October	10-11.45 am	Lecture notes
Lecture 13	Wednesday 10 October	8-9.45 pm	Lecture notes
Lecture 14	Tuesday 16 October	10-11.45 am	Lecture notes

Consultations in part intended to offer help with the two laborations, but also other help that students might need, take place Tuesays 8-9.45 am in room EA starting Tuesday 11 September.

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 2 in Miller and Childers	Exercises 2.3* (2.8), 2.6 (2.15 and 2.21), 2.10* (2.24), 2.11 (2.35), 2.16 (2.45), 2.26* (2.59), 2.29* (2.62), 2.30 (2.63)
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 2 in Miller and Childers	Exercises 2.8 (2.16), 2.12 (2.36), 2.19* (2.33), 2.22 (2.53), 2.25* (2.58), 2.32 (2.64)
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)
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)
Chapters 9 in Miller and Childers	Exercises 9.2 (9.9), 9.8 (9.23), 9.17 (9.25), 9.26* (9.19)
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)
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)
Lecture notes	Exercises 2, 7 and 9

Exercise supervisions mainly intended to offer help with the exercises (but also possibly other help) take place in room EA Fridays 10-11.45 am starting Friday 7 September.

Exercises	**Day**	**Programme**
Exercise 1	Friday 7 September	Chapters 2 and 3 in Miller and Childers' book
Exercise 2	Friday 14 September	Chapters 4 and 5 in Miller and Childers' book
Exercise 3	Friday 21 September	Chapter 8 in Miller and Childers' book
Exercise 4	Friday 28 September	Chapter 9 and 10 in Miller and Childers' book
Exercise 5	Friday 5 October	Chapter 11 in Miller and Childers' book
Exercise 6	Friday 12 October	Lecture notes
Exercise 7	Friday 19 October	Lecture notes