TWO YEAR DOUBLE DEGREE MASTERS PROGRAM
MS (TELECOMMUNICATION SYSTEMS)
by Andhra University
M.Sc(Electrical Engineering)
with emphasis on Telecommunication Systems
by BTH, Sweden
FIRST YEAR I SEMESTER

<table>
<thead>
<tr>
<th>CODE</th>
<th>Name of the Subject</th>
<th>Periods</th>
<th>Maximum Marks</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS1102</td>
<td>Random Processes</td>
<td>30</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>DV1205</td>
<td>Advanced C++</td>
<td>30</td>
<td>50</td>
<td>100</td>
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<tr>
<td>ET1305</td>
<td>TCP/IP – Internetworking</td>
<td>30</td>
<td>50</td>
<td>100</td>
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<tr>
<td>ETB108</td>
<td>Mobile Communication</td>
<td>30</td>
<td>50</td>
<td>100</td>
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</table>

I Sem. TOTAL CREDITS: 30
1 Course title and credit points
The course is titled Random Processes/Stokastiska processer and awards 7.5 credit points. One credit point högskolepoäng corresponds to one credit point in the European Credit Transfer System (ECTS).

2 Decision and approval
This course is established by The Board of the Department of Mathematics and Science 2007-02-13. The course descriptor is approved by The Board of the Department of Mathematics and Science and applies from 2007-02-13. Dnr: TEK56-65/2007. Replaces MSA002, Random Processes and Time Series Analysis.

3 Objectives
The objective of the course is that the student will get knowledge about stationary random processes and their application in technology.

4 Content
The course is primarily focused on stationary random processes from a probability point of view, analysed both in the time- and the frequency domain. Applications, especially in signal processing and telecommunications, are discussed.
• Repetition of some distributions for one-dimensional random variables
• Multi-dimensional random variables
• Orientation about simulation of random variables
• Chi-square test of hypotheses concerning distribution
• Random processes analysed in the time domain: Continuous and discrete time, stationarity, the autocovariance and autocorrelation functions, continuity, differentiation, integrals of random processes.
• Some special cases: the Poisson process, the normal (Gaussian) process
• Random processes analysed in the frequency domain: the Fourier transform, spectral density, the cross power spectral density
• Linear systems with random input: impulse response, transfer function, the relation between the spectral density for the input and for the output
• Markov chains
• Markov processes
• Basic queueing theory: M/M/m, M/G/1
• Applications from various technical fields: Signal processing, telecommunications, mechanics

5 Aims and learning outcomes
On completion of the course the student will be able to:
• Discuss and apply computation methods for random processes in linear systems
• Know the most important applications of random processes, especially in electrical engineering, mechanics and economy
• Describe how a problem involving random processes can be identified and solved
• Use the usual English vocabulary concerning random processes
6 Generic skills
The following generic skills are trained in the course:
• Capability to analyse and solve problems
• Capability to work in a team
• Knowledge of English
• Academic writing

7 Learning and teaching
The teaching consists of lectures and tutorials. It is expected that the student solve the problems at home and the
discuss the with the teacher at the tutorials.
The teaching language is partly, or fully, English

8 Assessment and grading
Examination of the course

<table>
<thead>
<tr>
<th>Code</th>
<th>Module</th>
<th>Credit</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>0710</td>
<td>Written examination</td>
<td>7.5hp</td>
<td>U/3/4/5</td>
</tr>
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</table>

The course will be graded U,3,4 or 5. On request grades according to ECTS will be given.

9 Course evaluation
The course coordinator is responsible for systematically gathering feedback from the students in course valuations
and making sure that the results of these feed back into the development of the course.

10 Prerequisites
7,5 credits in Linear algebra, 15 credits in one-variable calculus, 4,5 credits in multi-variable calculus, 3 credits in
theory of transforms and 7,5 credits in Mathematical statistics (or the equivalent).

11 Field of education and subject area
The course is part of the field of education Natural sciences and is included in the subject area mathematical
statistics.

12 Restrictions regarding degree
The course cannot form part of a degree with another course, the content of which completely or partly
corresponds with the contents of this course.

13 Additional information
The course is included in programmes at Blekinge Institute of Technology and is also available as a separate
course.

14 Course literature and other teaching material

Supplementary material from the Department of Mathematics and Science can be provided.
Course Name: Advanced C++
Course Code and Title: DV1205 (C++ Programming) 7.5 Credits

Topics / Syllabus:
1. C++ Introduction,
2. Classes and objects
3. Operator overloading
4. Inheritance
5. Polymorphism
6. Virtual functions
7. Stream and File input and output
8. Exceptions
9. Cast, and STL

Textbook:
Topics / Syllabus:

1. Internetworking :Course Introduction; Basics of Internetworking : Overview; Definitions; Architectural Model; Protocol Layering; Network Technologies; Internet Organization; Internet Backbones, NAPs and ISPs; IETF; Internet History
2. Internet Protocol : Definitions; RFCs; Datagram Delivery; Addressing; Subnetting; Segmentation & Reassembly; IPv4; IPv6; Internet Transition; ICMPv4/6; ARP; RARP; BOOTP; DHCP
3. IP Routing: Definitions; Classification; RFCs; Graph Abstraction; Least-Cost Algorithms; Static Routing; Distance Vector Routing; Link State Routing; RIPv1/2; OSPF; Other Routing Protocols; Routing with Partial Information; Exterior Routing; BGP; VPN; NAT
4. IP Multicast : Definitions; RFCs; Multicast Strategies; Requirements for Multicast; Multicast Routing Algorithms; IGMP; RPF; DVMRP; CBT; PIM; MOSPF
5. Mobile IP : Definitions; RFCs; Requirements for Mobility; Functional Entities; Functional Model for Mobility; MIP; New Developments
6. Transport Protocol : Definitions; RFCs; TCP: Services; Reliable Delivery; the Protocol; Segment Format; Connection Establishment and Termination; Data Transfer; Timers; Retransmission Timer Management; Window Management; Silly Window Syndrome; Performance Issues; New Developments; UDP: Services; Unreliable Delivery; the Protocol; Segment Format; RTP/RTCP: Services; Protocol Basics; Bandwidth Scaling
7. Domain Name System : Definitions; RFCs; DNS Services; Name Structure and Administration; DNS Resource Records; Query Messages; Name Servers; Service Requests; BIND

Laboratories

1. IP Routing;
2. Introduktion Opnet;
3. OSPF (Opnet);
4. TCP (Opnet);

Textbook:

Course Name: Mobile Communication
Course Code and Title: ETB108 (Mobile Communication) 7.5 Credits

Topics / Syllabus:

- Mobile services
- Wireless transmission
- Access methods
- Mobile telecommunications (GSM, GPRS, 3G/UMTS)
- Satellite Systems
- Wireless LAN (WLAN, Bluetooth)
- Mobile IP and TCP

Textbook: