

## **FOS Study Material (Updated May 2021)**

### **Telecommunication, Signal and Image Processing (Dr. Sesay)**

Fundamentals of Probability and Random Processes. Chapter 5 from “Fundamentals of Communication Systems” (2nd Ed.), John G. Proakis Masoud Salehi, Pearson.

Analog-to-Digital Conversion. Chapter 7 (Sections 7.1-7.6) from “Fundamentals of Communication Systems” (2nd Ed.), John G. Proakis Masoud Salehi, Prentice Hall.

Digital Modulation Methods in an Additive White Gaussian Noise Channel. Chapter 8 (Sections 8.1 – 8.7.3) from “Fundamentals of Communication Systems” (2nd Ed.), John G. Proakis Masoud Salehi, Pearson.

Coding for Reliable Communications. Chapter 13 (Sections 13.1- 13.2.3) from “Fundamentals of Communication Systems” (2nd Ed.), John G. Proakis Masoud Salehi, Pearson.

### **Power and Control Systems (Dr. Zareipour – Power Systems and Dr. Westwick – Control Systems)**

Power Systems. Chapter 2 and Chapter 5 from Power System Analysis and Design, J. D. Glover, M. S. Sarma, and T. J. Overbye, Cengage Learning.

Control Systems. Chapters 2, 3, 4, 5, 6, 8 and 13 from Modern Control Systems (12th Ed.), R.C. Dorf, and R.H. Bishop, Pearson.

### **Software Engineering (Dr. Moussavi)**

Databases. Chapters 3-8, 10, 12-14 from Database Systems: A Practical Approach to Design, Implementation and Management (6th Ed.), T. Connolly, and C. Begg, Pearson.

- Database Architectures and Web
- Relational Model
- Relational Algebra
- SQL data manipulation
- SQL data definition
- Database Analysis and Design
- Entity Relationship Modelling
- Normalization

Data structures and algorithms. Chapters 3-5, 9, 10 from Data Structures and Algorithm Analysis in Java, M.A. Weiss. Pearson.

- Lists, stacks and queues

- Trees
- Hashing
- Graphs
- Algorithm design techniques

Object-oriented design and design patterns. Chapters: 2, 4-9 from Object oriented software engineering, practical development using UML and Java, T. Lethbridge, and R. Laganieri, McGraw-Hill.

Topics:

- Principles of object orientation
- Developing requirements
- Modelling with classes
- Using design patterns
- Focusing on users and their tasks
- Modelling interactions and behaviour
- Architecting and designing software

## **Biomedical Engineering (Dr. Murari)**

Sensors and biopotential electrodes. Chapters 2, 5 from Medical Instrumentation: Application and Design (4th Ed.), J.G. Webster, Wiley.

Origin of biopotentials. Chapter 4 from Medical Instrumentation: Application and Design (4th Ed.), J.G. Webster, Wiley.

Biopotential amplifiers and signal processing. Chapters 3, 6 from Medical Instrumentation: Application and Design (4th Ed.), J.G. Webster, Wiley.

Medical Imaging Systems. Chapter 12 from Medical Instrumentation: Application and Design (4th Ed.), J.G. Webster, Wiley.

## **Circuits and Electronics (Dr. Murari)**

First and second order circuits. Chapters 7, 8 from Fundamentals of Electric Circuits (5th Ed.), C. Alexander, and M. Sadiku, McGraw-Hill.

Frequency response, Fourier and Laplace transforms. Chapters 14-17 from Fundamentals of Electric Circuits (5th Ed.), C. Alexander, and M. Sadiku, McGraw-Hill.

Bipolar and MOS Transistor circuits. Chapter 7 from Microelectronic Circuits (7th Ed.), A.S. Sedra, and K.C. Smith, Oxford University Press.

## **Computer Engineering (Dr. Mike Smith) – Exam Not available for June 2021**

Review of computer architecture, microcontrollers and their instruction sets; Interfacing using common input/output devices – e.g. SPI, GPIO; Strategies for interrupt handling and exception handling; Interfacing combining code using functions implemented in high level and assembly languages; Real time operating systems; Software and hardware optimizations to achieve real time operations; Processor characteristics needed to match the requirements for typical DSP applications; Hardware and software optimization techniques including multiple busses; Super-scalar and other highly parallel instruction sets, critical timing paths; Optimizing compilers and multi-processor operation. Digital Design and Computer Architecture (2nd Ed.), by D. Harris, and S.L. Harris, Morgan Kaufmann Publishers.

Interrupt handling, DMA and interfacing. Source material TBD.

## **RF Circuits and Applied Electromagnetics (Dr. Vyas)**

Electromagnetic fields and waves. Chapters 4, 5, 7-12 from Elements of Electromagnetics (6th Ed.), M. Sadiku, Oxford.

Microwave amplifiers. Chapters 2-4 from Microwave Transistor Amplifiers: Analysis and Design (2nd Ed.), G. Gonzalez, Prentice Hall.

RF and Microwave Circuits. Chapters 1-7, 10, 12 from Microwave Engineering (4th Ed), David M.Pozar, Wiley.