EE0001 EFFECTS OF ELECTROMAGNETIC RADIATION ON HUMANS

Academic Units: 3

Contact Hours (per week) | 39

Pre-requisite | -

Contents

Fundamental of Electromagnetic Radiation. Impacts of Radio Transmission. Impacts of Wireless Technologies. Impacts of Lasers and Light Sources. Impacts of X-Ray and Tera-Hertz Technologies. Impacts of UV and Gamma Rays.

References

1. Peter Stavroulakis (ed.), Biological Effects of Electromagnetic Fields: Mechanisms, Modeling, Biological Effects, Therapeutic Effects, International Standards, Exposure Criteria, Sprinter, 2003.
2. Barnes Frank S and Greenebaum Ben, Handbook of biological effects of electromagnetic fields. Biological and medical aspects of electromagnetic fields, 3rd Edition, CRC Press, 2007. (QP82.2.E43H236)
3. Wheeler Tom, Electronic Communications for Technicians, 2nd Edition, Pearson Prentice Hall, 2006. (TK5101.W564 + 1 CD)
4. Hecht Jeff, Understanding Lasers: An Entry-Level Guide, 3rd Edition, John Wiley & Sons, 2008. (TA1675.H447 2008)

EE1002 PHYSICS FOUNDATION FOR ELECTRICAL & ELECTRONIC ENGINEERING

Academic Units: 4

Contact Hours | Lecture – 39 ; Tutorial – 12

Pre-requisite | FE1011/FE1012/PH1011/PH1012

Content

Introduction to electromagnetic fields and applications. Electromagnetic in electronics, circuits and communications. Introduction to light, lasers and optical spectroscopy. Principles of geometric and wave optical components. Introduction to quantum physics and applications. Applications of quantum physics in electronics and lasers.

Textbooks

1. Serway, Raymond A and Jewett John W, Physics for Scientists and Engineers with Modern Physics, 9th Edition, Brooks/Cole, 2014. (QC23.S492P 2014)
2. Randall D. Knight, Physics for scientists and engineers, (QC23.2.K71 2004)

References

1. Giancoli Douglas C, Physics for Scientists & Engineers with Modern Physics, 4th Edition, Pearson Prentice Hall, 2009. (QC21.2.G433 2009).
2. Young Hugh D, Freedman Roger A, Ford A Lewis and Sears Francis Weston, University Physics : with Modern Physics, 13th Edition, Addison-Wesley, 2012. (QC21.2.Y72U 2012)
3. Walker Jearl, Halliday David and Resnick Robert, Fundamentals of Physics, 9th Edition, Wiley, 2011. (QC21.3.W181 2011)

EE1003 INTRODUCTION TO MATERIALS FOR ELECTRONICS

Academic Units: 3

Contact Hours | Lecture – 26 ; Tutorial – 12

Pre-requisite | -

Contents

Materials and Society. Bond potentials, valance charge, crystal structures and defects. Ceramics for electronics. Semiconductor materials. Nanostructures and nanoelectronics. Organic electronics.

Textbooks

1. Callister William D and Rethwisch David G, Materials Science and Engineering, 8th Edition, John Wiley & Sons, 2011. (TA403.C162 2011)
2. Smith William F and Hashemi Javad, Foundations of Materials Science and Engineering, 5th Edition, McGraw-Hill, 2010. (TA403.S663 2010)

References

1. Serway Raymond A and Jewett John W, Physics for Scientists and Engineering with Modem Physics, 9th Edition, Brooks/Cole, 2014. (QC23.S492P 2014)
3. Kasap Safa O, Principles of Electronic Materials and Devices, 3rd Edition, McGraw-Hill, 2006. (TK453.K19 2006)

EE2001 CIRCUIT ANALYSIS

Academic Units: 4

Contact Hours | Lecture – 39 ; Tutorial – 12

Pre-requisite | -

Contents

Circuit Theorems. Energy Storage Elements and Transient Response. Laplace Transforms in Circuit Analysis. Network Functions and Two-port Networks. Alternating Current Circuits. Balanced Three Phase Circuits.

Textbook

1. Alexander Charles K and Sadiku Matthew N O, Fundamentals of Electric Circuits, 5th Edition,McGraw-Hill, 2013. (TK454.A375 2013)

References

1. Hayt William Hart, Kemmerly Jack Ellsworth and Durbin Steven M, Engineering Circuit Analysis, 8th Edition, McGraw Hill, 2012. (TK454.H426 2012)
2. Nilsson James William and Riedel Susan A, Electric Circuits, 9th Edition, Pearson/Prentice-Hall, 2011. (TK454.N712 2011)

EE2002 ANALOG ELECTRONICS

Academic Units: 4
Contact Hours | Lecture – 39 ; Tutorial – 12
Pre-requisite | EE2001

Contents

Diode circuit analysis. Bipolar junction transistors. MOSFET devices. Small-signal amplifiers. Multistage and differential amplifiers. Current Sources and Current Mirrors. Frequency response. Operational amplifiers. Applications.

Textbook

1. Jaeger Richard C & Blalock Travis N, Microelectronic Circuit Design, 4th Edition, McGraw-Hill, 2011. (TK7874.J22M 2011)

References

1. Sedra Adel S and Smith Kenneth Carless, Microelectronic Circuits, 6th Edition, Oxford University Press, 2010. (TK7867.S449 2010)
2. Franco Sergio, Design with Operational Amplifiers and Analog Integrated Circuits, 3rd Edition, McGraw-Hill, 2002. (TK7874.F825 2002)

EE2003 SEMICONDUCTOR FUNDAMENTALS

Academic Units: 4
Contact Hours | Lecture – 39 ; Tutorial – 12
Pre-requisite | EE1002

Contents

Basic Semiconductor Concepts. Semiconductor in Equilibrium and Carrier Transport Phenomena. Semiconductor in Non-Equilibrium. PN Junction and Metal-Semiconductor Contacts. Bipolar Junction Transistor and Metal Oxide Field Effect Transistor. Optoelectronic Devices.

Textbook

1. Neamen Donald A, Semiconductor Physics and Devices: Basic Principles, 4th Edition, McGraw-Hill, 2012. (QC611.N348 2012)

References

1. Streetman Ben G and Banerjee Sanjay Kumar, Solid State Electronic Devices, 6th Edition, Pearson/Prentice-Hall, 2006. (TK7871.85.S915 2006)
2. Sze S M, Semiconductor Devices, Physics and Technology, 3rd Edition, John Wiley, 2012. (TK7871.85.S997 2012)
3. Kasap Safa O, Principles of Electronic Materials and Devices, 3rd Edition, McGraw-Hill, 2006. (TK453.K19 2006)

EE2004 DIGITAL ELECTRONICS

Academic Units: 4
Contact Hours | Lecture – 39 ; Tutorial – 12
Pre-requisite | -

Contents

Digital Fundamentals. Digital Circuits; Combinational Logic Principles. Combinational Logic Circuits. Sequential Logic Principles. Sequential Logic Circuits. Memory, CPLDs, and FPGAs.

Textbook

1. Wakerly John F, Digital Design: Principles and Practices, 4th Edition, Pearson Prentice-Hall, 2006. (TK7874.W149 2006)

References

1. Roth Charles H and Kinney Larry L, Fundamentals of Logic Design, 7th Edition, Cengage Learning, 2014. (TK7868.L6R845 2014)
2. Marcovitz Alan B, Introduction to logic design, 3rd Edition, McGraw-Hill, 2010. (TK7868.L6M321 2010)
3. Mano M Morris and Ciletti Michael D, Digital Design : With a Introduction to the Verilog HDL, 5th Edition, Pearson Prentice Hall, 2013. (TK7888.3.M285 2013)

EE2006 ENGINEERING MATHEMATICS I

Academic Units: 4
Contact Hours | Lecture – 39 ; Tutorial – 12
Pre-requisite | FE1007/MH1811 or EE2092/MH2810

Contents

Fourier Analysis. Laplace Transform. Partial Differential Equations. Numerical Methods. Probability. Mathematical Statistics.

Textbooks

1. Kreyszig Erwin, Herbert Kreyszig and Nominton E J, Advanced Engineering Mathematics, 10th Edition, John Wiley, 2011. (QA401.K92 2011)
2. Johnson Richard Arnold and Bhattacharyya Gouri K, Statistics: Principles and Methods, 6th Edition, John Wiley, 2010. (QA276.12.J68 2010)
3. Patricia J. Y. Wong and Sundararajan N., Engineering Mathematics, McGraw-Hill, 2010.

References

1. O'Neil Peter V, Advanced Engineering Mathematics, 7th Edition, Cengage Learning, c2012. (TA330.N58 2012)
2. James Glyn, Advanced Modern Engineering Mathematics, 4th Edition, Pearson, 2011. (TA330.A244 2011)
3. Milton J Susan and Arnold Jesse C, Introduction to Probability and Statistics: Principles and Applications for Engineering and The Computing Sciences, 4th Edition, McGraw-Hill, 2003. (TA330.M662 2003)

4. Singh Ravish R and Bhatt Mukul, Engineering Mathematics, McGraw Hill, 2010. (TA333.S617)

EE2007 ENGINEERING MATHEMATICS II

Academic Units: 4
Contact Hours | Lecture – 39 ; Tutorial – 12
Pre-requisite | FE1007/MH1811 or EE2092/MH2810

Contents

Linear algebra. Complex variables. Vector differential calculus. Vector integral calculus.

Textbook

1. Kreyszig Erwin, Herbert Kreyszig and Nominton E J, Advanced Engineering Mathematics, 10th Edition, John Wiley, 2011. (QA401.K92 2011)

References

1. Greenberg Michael D, Advanced Engineering Mathematics, 2nd Edition, Prentice-Hall, 1998. (TA330.G798 1998)
2. James Glyn, Advanced Modern Engineering Mathematics, 4th Edition, Pearson, 2011. (TA330.A244 2011)
3. Er Meng Joo, Engineering Mathematics with Real-World Applications, McGraw Hill, 2005. (TA330.E65)

EE2008 DATA STRUCTURES AND ALGORITHMS

Academic Units: 3
Contact Hours | Lecture – 26 ; Tutorial – 12
Pre-requisite | -

Contents

Introduction. Principles of algorithm analysis. Data structures. Searching. Sorting. Algorithm design techniques.

Textbook

1. Huang Guangbin and Ng Jim Mee, Data Structures and Algorithms, Pearson Education, 2007. (QA76.9.D35D232DS)

References

1. Johnsonbaugh Richard and Schaefer Marcus, Algorithms, Pearson Education, 2004. (QA76.9.A43J65)
2. Levitin Anany, Introduction to The Design & Analysis of Algorithms, 3rd Edition, 2012. (QA76.9.A43L666 2012)

EE2010 SIGNALS AND SYSTEMS

Academic Units: 4
Contact Hours | Lecture – 39 ; Tutorial – 12
Pre-requisite | FE1006 & FE1007 or MH1810 & MH1811 or EE2092/MH2810

Contents

Signals and Systems. Linear Time-Invariant Systems. Fourier Representation of Signals and LTI Systems. Sampling. Modulation.

Textbook

1. Roberts Michael J, Fundamentals of Signals and Systems, 1st Edition, McGraw-Hill, 2008. (TK5102.9.R646F)

References

1. Hwei Hsu, Schaums Outlines Signals and Systems, 2nd Edition, Mc-Graw Hill, 2011. (TK5102.92.H873 2011)
2. Oppenheim Alan V, Willsky Alan S and Nawab Syed Hamid, Signals and Systems, 2nd Edition, Prentice-Hall, 1997. (QA402.P62 1997)
3. Haykin Simon S and Van Veen Barry, Signals and Systems, Wiley, 2nd Edition, 2003. (TK5102.5.H419)
4. Mandal Mrinal Kr and Asif Amir, Continuous and Discrete Time Signals and Systems, 1st Edition, Cambridge University Pres, 2007. (QA402.M271)

EE2071 LABORATORY 2A

Academic Unit: 1
Contact Hours | Laboratory – 39
Pre-requisite | -

Contents

The experiments of this laboratory course provide students with extensive practical training in the various areas of electrical and electronic engineering.

Experiments

L211 - Series Resonance And Time/Frequency Response of Passive Networks
L212 - Two-Port Network Parameters And Transient Response
L213 – Logic Circuit Simulation
L214 - Abstract Data Types & Their Implementations
L215 - Algorithmic Approach to Problem Solving
L216 - PCB Layout Design (No Report)
L217 - Arithmetic and Sequential Circuits
L218 - Counter and Shift Register

EE2072 LABORATORY 2B

Academic Unit: 1
Contact Hours | Laboratory – 24
Pre-requisite | -

Contents

A series of eight Laboratory experiments designed to provide understanding of fundamental theories and practical applications relating to some of the Year 2 courses in electrical and electronic engineering.

Experiments

L221 - Analog Circuit Design

L222 - Diode Rectifier Circuits

L223 - BJT Amplifier

L224 - Linear Time Invariant (LTI) Systems, Convolution and Impulse Response

L225 - Fourier Representation of Signals and Filtering

L226 - Semiconductor Parameter Measurements

L227 - PN Junction Devices

L228 - Operational Amplifier - Parameters and Applications

EE2073 INTRODUCTION TO ENGINEERING DESIGN AND PROJECT

Academic Units: 2

Contact Hours | Lecture – 6 ; Laboratory – 33

Pre-requisite | -

Contents

Data Acquisition System and Application. Electronic Circuit and System Design. LabVIEW Software Design and Development. Prescribed Project for the Course.

Textbooks

1. Bishop Robert H, Learning with LabView 8, Pearson Prentice Hall, 2007
2. Tooley Mike, Electronic Circuit - Fundamental and Application[electronic resource], 3rd Edition, Elsevier, 2006

MH2810 MATHEMATICS A

Academic Unit | 4

Contact Hours | Lecture – 39 ; Tutorial – 12

Pre-requisite | -

Contents

Differentiation and integration. Ordinary differential equations. Partial differentiation. Multiple integrals. Infinite sequences and series. Vectors.

Textbook

1. G.B. Thomas, M.D. Weir and J.Hass, Thomas' Calculus, 12th Edition, Addison-Wesley, 2009. 9780321587992

Reference

1. K. A. Stroud and D. Booth, Engineering Mathematics, 5th, 6th, 7th, Palgrave Macmillan, 2013. 978-0831134709

EE3001 ENGINEERING ELECTROMAGNETICS

Academic Units: 4

Contact Hours | Lecture – 39 ; Tutorial – 12 ; Laboratory – 6

Co-requisite | EE2007

Contents

Static electric and magnetic fields. Maxwell's equations. Wave equation and uniform plane waves. Electromagnetic energy transfer. Reflection of electro-magnetic waves. Transmission lines.

Textbooks

1. Sadiku Matthew N O, Elements of Electromagnetics, 5th Edition, Oxford University Press, 2010. (QC760.S125 2010)
2. Hayt William Hart and Buck John A, Engineering Electromagnetics, 8th Edition, McGraw-Hill, 2012. (QC670.H426 2012)

Reference

1. Ulaby Fawwaz Tayssir, Electromagnetics for Engineers, Pearson Prentice-Hall, 2005. (QC760.U36E)

EE3002 MICROPROCESSORS

Academic Units: 4

Contact Hours | Lecture – 39 ; Tutorial – 12 ; Laboratory – 6

Pre-requisite | -

Contents

Introduction to ARM core and programmer's model. Assembler Directives. Loads, Stores and Addressing. Logic and Arithmetic. Flow control instructions. Subroutines, Stacks and Exception Handling. Thumb Instructions and C language. Peripherals Interfacing.

Textbook

1. Hohl William, ARM Assembly Language: Fundamentals and Techniques, CRC Press, 2009. (QA76.73.A8H719).

References

1. Lewis Daniel Wesley, Fundamentals of Embedded Software: with the ARM Cortex-M3, 2nd Edition, Prentice Hall, 2013. (TK7895.E42L673 2013)
2. Sloss Andrew N, Symes Dominic and Wright Chris, ARM System Developer's Guide: Designing and Optimizing System Software, Elsevier / Morgan Kaufmann. 2004. (QA76.76.D47S634)
3. Patterson David A and Hennessy John L, Computer Organization and Design: The Hardware/Software Interface, (ARM edition), 4th Edition, Morgan Kaufmann 2011. (QA76.9.C643P317 2009)

EE3010 ELECTRICAL DEVICES AND MACHINES

Academic Units: 3
Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 6
Pre-requisite | EE2001

Contents

Electromagnetic Principles and Actuators. Transformers. DC Machines. AC Machines.

Textbook

1. Guru Bhag S and Hiziroglu Huseyin R, Electric Machinery and Transformers, 3rd Edition,Oxford University Press, 2001. (TK2000.G981 2001)

References

1. Sen Paresh Chandra, Principles of Electric Machines and Power Electronics, 2nd Edition, John Wiley & Sons, 1997. (TK2000.S474P 1997)
2. Chapman Stephen J, Electric Machinery and Power System Fundamentals, 1st Edition, McGraw-Hill, 2002. (TK2000.C466E)

EE3011 MODELLING AND CONTROL

Academic Units: 3
Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3
Pre-requisite | EE2006

Contents

Introduction to Control Systems. System Modelling. Time Domain Analysis. Performance of Feedback Control Systems. Root-locus Technique. Frequency Domain Analysis. Relative Stability and Design Specifications. System Compensation and PID Control.

Textbook

1. Ogata Katsuhiko, Modern Control Engineering, 5th Edition, Prentice-Hall, 2010. (TJ213.G34 2010)

References

1. Dorf Richard C and Bishop Robert H, Modern Control Systems, 12th Edition, Pearson Prentice Hall, 2011. (TJ216.D695 2011)
2. Kuo Benjamin C and Golnaraghi Farid, Automatic Control Systems, 9th Edition, John Wiley, 2010. (TJ213.K96 2010)

EE3012 COMMUNICATION PRINCIPLES

Academic Units: 3
Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3
Pre-requisite | EE2010

Contents

Review of signal analysis and noise representations. Linear modulation. Frequency and phase modulation. Digital communication principles.

Textbook

1. Couch Leon W, Digital and Analog Communication Systems, 8th Edition, Pearson, 2013. (TK5101.C853 2013)

References

1. Proakis John G and Salehi Masoud, Communication Systems Engineering, 2nd Edition, Prentice-Hall, 2002. (TK5101.P962 2002)
2. Lathi Bhagwandas Pannalal, Modern Digital and Analog Communication Systems, 4th Edition, Oxford University Press, 2009. (TK5101.L352 2009)
3. Haykin Simon S and Moher Michael, Communication Systems, 5th Edition, John Wiley, 2010. (TK5101.H419 2010)

EE3013 SEMICONDUCTOR DEVICES AND PROCESSING

Academic Units: 3
Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3
Pre-requisite | EE2003

Contents

Fundamentals of Bipolar Devices. MOS Devices. Crystal growth and wafer preparation. Deposition Techniques. Diffusion and thermal oxidation. Ion implantation. Lithography. Etching.

Textbook

1. Stephen A. Campbell, Fabrication Engineering at the Micro- and Nanoscale, 3rd Edition, Oxford University Press, 2008. (TK7871.85.C191F, E-book)

References

1. Jaegar Richard C, Introduction to Microelectronic Fabrication: Vol 5 of Modular Series in Solid State Devices, 2nd Edition, Prentice-Hall, 2002. (TK7874.J22 2002)
2. Quirk Michael and Serda Julian, Semiconductor Manufacturing Technology, Prentice-Hall, 2001 (TK7836.Q93)

EE3014 DIGITAL SIGNAL PROCESSING

Academic Units: 3
Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3
Pre-requisite | EE2010

Contents

Introduction. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT). Z-Transform. Digital Filter Design.

Textbooks

1. Oppenheim Alan V, Schafer Ronald W and Buck John R, Discrete-Time Signal Processing, 3rd Edition, Pearson Education, 2009.
2. Prandoni Paolo and Vetterli Martin, Signal Processing for Communication, 1st Edition, EPFL Press. (TK5102.9.P899) Download here http://www.sp4comm.org/webversion.html

Reference

1. Mitra Sanjit K, Digital Signal Processing : A Computer Based Approach, 4th Edition, McGraw-Hill, 2011. (TK5102.9.M684 2011)

EE3015 POWER SYSTEMS AND PROTECTION

Academic Units: 3

Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3

Pre-requisite | EE2001

Contents

Fundamentals of Power Systems. Power Systems Operation and Analysis. Power Systems Fault Analysis. Over-current Protection of Distribution Systems. Differential Protection of Power Apparatus.

Textbooks

1. Chapman Stephen J, Electric Machinery and Power System Fundamentals, 1st Edition, McGraw-Hill, 2002. (TK2000.C466E)
2. Blackburn J Lewis, Protective Relaying: Principles and Applications, 3rd Edition, CRC Press, 2007. (TK2861.B628 2007)

References

1. Wildi Theodore, Electrical Machines, Drives and Power Systems, 6th Edition, Pearson/Prentice-Hall, 2006. (TK2182.W673 2006)
2. Weedy Birron Mathew and Cory Brian John, Electric Power Systems, 5th Edition, John Wiley, 2012. (TK1001.W394 2012)
3. Anderson Paul M, Power System Protection, McGraw-Hill, IEEE Press, 1999. (TK1010.A548)

EE3017 COMPUTER COMMUNICATIONS

Academic Units: 3

Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3

Pre-requisite | -

Contents

Introduction to computer communications. Data Communications Fundamentals. Data Link Control. Local Area Networks. Internetworking.

Textbook

1. Ng Chee Hock and Ma Maode, Computer Communications, McGraw-Hill, 2009. (TK5105.5.N576)

References

1. Stallings William, Data and Computer Communications, 9th Edition, Pearson/Prentice-Hall, c2011. (TK5105.S782 2011)
2. Kurose James F and Ross Keith W, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2013. (TK5105.875.I57K96 2013)
3. Leon-Garcia Alberto and Widjaja Indra, Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw-Hill, 2004. (TK5101.L579 2004)

EE3018 INTRODUCTION TO PHOTONICS

Academic Units: 3

Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3

Pre-requisite | -

Contents

Geometrical Optics. Wave Optics. Propagation of light in Matters. Photon Optics. Laser Optics. Applications of Photonics.

Textbook

1. Pedrotti Frank L, Pedrotti Leno Matthew and Pedrotti Leno S, Introduction to Optics, 3rd Edition, Pearson Prentice Hall, 2007. (QC355.2.P372 2007)

References

1. Smith Warren J, Modern Optical Engineering: The Design of Optical Systems, 4th Edition, McGraw-Hill, 2008. (TS513.S663 2008)
2. Kasap S O, Optoelectronics and Photonics: Principles and Practices, Prentice-Hall, 2001. (TK8304.K19)
3. Prasad Paras N, Introduction to Biophotonics, Wiley-Interscience, 2003. (QH515.P911)

EE3019 INTEGRATED ELECTRONICS

Academic Units: 3

Contact Hours | Lecture – 26 ; Tutorial – 12 ; Laboratory – 3

Pre-requisite | EE2002

Contents

Feedback amplifier. Voltage reference and current sources. Operational amplifier circuits. Applications of operational amplifiers. Power supplies. CMOS logic circuits. CMOS flip-flops and memories.

Textbook

1. Sedra Adel S and Smith Kenneth Carless, Microelectronic Circuits, 6th Edition, Oxford University Press, 2010. (TK7867.S449 2010)

References

1. Kang Sung-Mo and Leblebici Yusuf, CMOS Digital Integrated Circuits: Analysis and Design, 3rd Edition, McGraw-Hill 2005. (TK7871.99.M44K16 2005)
2. Gray Paul R and Meyer Robert G, Analysis and Design of Analog Integrated Circuits, 5th Edition, John Wiley, 2010. (TK7874.G781 2010)

3. Franco Sergio, Design with Operational Amplifiers and Analog Integrated Circuits, 3rd Edition, McGraw-Hill, 2002. (TK7874.F825 2002)

EE3179 INDUSTRIAL ATTACHMENT

Academic Units: 8

Contact Hours | 20 weeks (full-time)

Pre-requisite | Third year standing and completed at least 4 (First year engineering) / 2 (Poly-direct intake) semesters of studies.

Contents

Every participating organisation is required to provide an initial proposal of an attachment programme for each of the students. The attachment programme should have emphasis on applications, management and hands-on experience for the students. Prior to the start of the Industrial Attachment, academic staff from the School visit new organizations which have offered placements for IA. The purpose is to review, discuss and develop (if required) further details on the proposed attachment programmes. Every IA student, during the first three weeks of the attachment, has to develop the initial attachment programme proposed by the participating organisation into a work plan/schedule with specific self-directed learning objectives to meet NTU's attachment objectives.

EE3080 DESIGN AND INNOVATIVE PROJECT

Academic Units: 2

Contact Hours | Lecture – 6 ; Laboratory – 78

Pre-requisite | -

Objective

The main objectives of the Design and Innovative Project are to introduce students to electrical and electronic engineering projects, provide with students an opportunity to exercise their creative and innovative qualities in a group project environment and excite the imagination of aspiring engineers, innovators and technopreneurs.

Contents

Project Proposal, Lectures on Project Management, Project Implementation, Project Report, Oral Presentation, Design and Innovation Competition.

EE4001 SOFTWARE ENGINEERING

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | -

Contents

Introduction to software engineering. Software project management. Software requirements and specifications. Software design. Software testing and maintenance.

References

1. Sommerville Ian, Software Engineering, 9th Edition, Addison-Wesley, 2011. (QA76.758.S697 2011)
2. Pressman Roger S, Software Engineering: A Practitioner's Approach, 7th Edition, McGraw-Hill, 2010. (QA76.758.P935S 2010)
3. Pezze Mauro, and Young Michal, Software Testing and Analysis: Process, Principles and Techniques, Wiley, 2008. (QA76.76.T48P522)
4. Bob Hughes and Mike Cotterell, Software Project Management, 5th Edition, McGraw-Hill, 2009.
5. Pressman Roger S and Lowe David, Web Engineering: A Practitioner's Approach, McGraw-Hill, 2009. (TK5105.88813.P935)

EE4040 ENGINEER AND SOCIETY

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | Year 4 classification

Contents

The course comprises 4 main topics: Evolution of Modern Singapore; Technology & Society; Ethics and Professionalism and The Environment. The students are made aware of "Current Issues" at the time of their study.

References

1. Kwa Chong Guan, Derek Heng & Tan Tai Yong, Singapore: A Seven-Hundred Year History, (Singapore: National Heritage Board, National Archives of Singapore, 2009).
2. Singapore: Journey Into Nationhood, National Heritage Board: Landmark Books, 1998. (DS610.4.S617j)
3. Johnston Stephen F, Gostelow J Paul and King W Joseph, Engineering and Society: Challenges of Professional Practice, Prentice-Hall, 2000. (TA157.J73)
4. Lee Kuan Yew, From Third World to First. The Singapore Story: 1965:2000, Memoirs of Lee Kuan Yew, Times Editions, 2000. (DS598.S7L478f)
5. Plagiarism 2.0 [videorecording] : Information Ethics in the Digital Age, Fabian and Rhonda. (PN167.P698 – BUSL) (H587897 – BUSLAVRES)

EE4041 HUMAN RESOURCE MANAGEMENT

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | Year 4 classification

Contents

Using case studies and current events to: understanding individual and group behavior in organizations: the impact of globalization, continuous learning, work values and corporate culture; visionary and transformational leadership strategies: motivation, teambuilding and talent development, ethical behavior and integrity; Managing work groups: organizational communications and conflict resolution strategies, leveraging on diversity; Quality and excellence concepts: stakeholders awareness, customer-centred mindset, people-centred management approaches, innovative adaptation to continuous change, learning organization, global talent search; Trade unions, collective bargaining and labour-management relations challenges and prospects.

Textbooks

1. Chan & Tan, Transforming & Leading Organizational Behavior, Cengage Learning, 2012.
2. Alan Price, Fundamentals of Human Resource Management, South Western Cengage Learning, 2011.

References

1. Robbins Stephen P and Judge Timothy Organizational Behavior, 15th Edition, Pearson, 2012. (HD58.7.R636 2013)
2. Losey Michael R, Meisinger Susan R and Ulrich Dave, The Future of Human Resource Management: 64 Thought Leaders Explore the Critical HR Issues of Today and Tomorrow, John Wiley, 2005. (HF5549.F996F)
3. Collins, James C & Porras, Jerry I, Built to Last: Successful Habits of Visionary Companies, Harper Business, 2002. (HF5386.C712 2002)
4. Kim W Chan and Mauborgne Renée, Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant, Harvard Business School, 2005. (HF5415.153.K49)
5. Mayo Andrew, The Human Value of the Enterprise: Valuing People as Assets - Monitoring, Measuring, Managing, Nicholas Brealey Publishing, 2001. (HD53.M473)
6. George Stephen, The Baldrige Quality System: The Do-it-yourself Way to Transform your Business, John Wiley, 1992. (HD62.15.G349b)
7. Fitz-Enz Jac, The 8 Practices of Exceptional Companies: How Great Organizations Make the most of their Human Assets, AMACOM, 1997. (HD58.9.F548t)
8. Senge Peter M, The Fifth Discipline: The Art and Practice of the Learning Organization, Currency Doubleday, 2006. (HD58.9.S476 2006)
9. Chew Soon Beng, Trade Unionism in Singapore, McGraw-Hill, 1991. (HD6820.67.C529)

EE4079 FINAL YEAR PROJECT

Academic Units: 10

Pre-requisite | Refer to FYP Website

Contents

As part of NTU's curriculum, all final year students of the School of EEE are required to undertake a project, supervised by one or two faculty members. This project will involve an in-depth study, investigation, construction of hardware and/or development of software and testing in any of the areas of specialized courses offered in a final year option group, and spread over the entire academic year. Students are required to submit a formal report, carry out a project demonstration and make an oral presentation on completion of the project. Projects may include, but are not limited to, one or more of the following areas: design, product development, software development, laboratory investigation, computing and analysis, field-testing and instrumentation and feasibility studies. Besides project proposals generated by its own academic staff, the school also works with outside partners including the A*STAR Research Institutes and industrial companies to propose relevant projects.

EE4105 CELLULAR COMMUNICATION SYSTEM DESIGN

Academic Units: 2

Contact Hours (per week) | Lecture – 13 ; Laboratory – 26

Pre-requisite | -

Contents

The students will be involved in the planning and design of cellular and wireless personal communication systems at the system level. Issues such as the choice of modulation and channel coding schemes as well as multiple access methods will be dealt with. Fundamentals of digital signal processing will be briefly introduced. DSP techniques used in the design of baseband digital signal transmission and reception will be covered. Carrier-modulated signals, such as AM, QAM and PSK signals, used for transmission through band-pass channels will be discussed. Channel equaliser design for compensation of channel distortions and inter-symbol interference (ISI) will be dealt with.

References

1. Karim M R and Saraf Moshen, W-CDMA and CDMA2000 for 3G Mobile Networks, McGraw Hill, 2002. (TK5103.452.K18)
2. Rappaport Theodore S, Wireless Communications: Principles and Practice, 2nd Edition, Prentice-Hall, 2002. (TK5103.2.R221 2002)
3. Garg Vijay Kumar, IS-95 CDMA and CDMA2000: Cellular/PCS Systems Implementation, Prentice-Hall, 2000. (TK5103.452.G231)
4. Proakis John G, Salehi Masoud and Bauch Gerhard, Contemporary Communication Systems Using MATLAB and Simulink, 3rd Edition, Brooks/Cole, 2013. (TK5105.P962 2013)

5. Proakis John G and Manolakis Dimitris G, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Pearson Prentice-Hall, 2007. (TK5102.9.P932)

EE4109 MICROWAVE CIRCUIT AND SYSTEM DESIGN

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | -

Contents

Students will be involved in the design of advanced wireless communication systems as well as microwave planar components. It will include the analysis, design and simulation of wireless communication and radar systems as well as the analysis, design and simulation of microwave integrated circuits.

References

1. Pozar David M, Microwave and RF wireless systems, John Wiley, 2001. (TK5103.2.P893)
2. Edde Byron, Radar: Principles, Technology, Applications, Prentice-Hall, 1993. (TK6575.E21)
3. Chang Kai, Handbook of RF/Microwave Components and Engineering, 2nd Edition, John Wiley, 2003. (TK6560.H236)

EE4110 OPTICAL COMMUNICATION SYSTEM DESIGN

Academic Units: 3
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | -

Contents

Students will be involved in the design of fibre optic communication systems. Issues such as light propagation, fibre characteristics and classification, fibre cables, connectors and splices, optical transmitters and receivers, optical amplifier and filter, optical coupler and wavelength converter, nonlinear effects in WDM systems, and system design methodology are covered.

Textbook

1. Keiser Gerd, Optical Fiber Communications, 4th Edition, McGrw Hill, 2011. (TK5103.59.K27 2011)

References

1. Hecht Jeff, Understanding Fiber Optics, 5th Edition, Pearson/Prentice-Hall, 2006. (TA1800.H447 2006)
2. Powers John P, An Introduction to Fiber Optic Systems, 2nd Edition, Irwin, 1999. (TA1800.P888 1999)
3. Palais Joseph C, Fiber Optic Communications, 5th Edition, Pearson/Prentice-Hall, 2005. (TK5103.59.P154 2005)
4. Ramswami Rajiv and Sivarajan Kumar N, Optical Networks: A Practical Perspective, 3rd Edition, Morgan Kaufmann 2008.

EE4151 RF AND MICROWAVE ENGINEERING

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3001

Contents

RF and microwave circuit analysis. Planar transmission lines and discontinuities. Planar couplers and filters.

Textbooks

1. Pozar David M, Microwave Engineering, 4th Edition, John Wiley, 2012. (TK7876.P893 2012)
2. Constantine A. Balanis, Antenna Theory : Analysis and Design, 3rd Edition, John Wiley, 2005. (TK7871.6.B171 2005)

References

1. Ramo Simon, Whinnery J R and Van Duzer T, Fields and Waves in Communication Electronics, 3rd Edition, John Wiley, 1994. (QC665.E4R175 1994)
2. Hong Jia-Sheng and Lancaster M J, Microstrip Filters for RF/Microwave Applications, 2nd Edition, John Wiley, 2011. (TK7876.H769 2011)

EE4152 DIGITAL COMMUNICATIONS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3012

Contents

Digital communication principles. Information theory. Error correcting codes. Optimum signal detection.

Textbook

1. B P Lathi and Z. Ding, Modern Digital and Analog Communication Systems, 4th Edition, Oxford University Press, 2009. (TK5101.L352 2009)

References

1. S. Haykin and K. Moher, Communication Systems, 5th Edition, John Wiley, 2010. (TK5101.H419 2010)
2. J. G. Proakis and M. Salehi, Communication Systems Engineering, 2nd Edition, Prentice-Hall, 2002. (TK5101.P962 2002)

EE4153 TELECOMMUNICATION SYSTEMS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3012

Contents

Telecommunication networks. Switching and signaling. Line transmission. Microwave communication systems. Optical fibre communication systems and applications.

Textbooks

1. Flood John Edward, Telecommunications Switching, Traffic and Networks, Prentice-Hall, 1995 (reprinted 1999). (TK5103.F631)
2. Tomasi Wayne, Electronic Communications System: Fundamentals Through Advanced, 5th Edition, Pearson Prentice-Hall, 2005. (TK5101.T655E 2004)

References

1. Keiser Gerd, Optical Fiber Communications, 4th Edition, McGrw Hill, 2011. (TK5103.59.K27 2011)
2. Beasley Jeffrey S and Miller Gray M, Modern Electronic Communication, 9th Edition, Pearson/Prentice-Hall, 2008. (TK5101.M648 2008)
3. Bellamy John C, Digital Telephony, 3rd Edition, John Wiley, 2000. (TK5103.7.B435 2000)

EE4188 WIRELESS COMMUNICATIONS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3012

Contents

Types of wireless systems. Radio frequency spectrum. Performance calculations. Cellular radio systems.

Textbooks

1. Agrawal Dharma Prakash and Zeng Qing-An, Introduction to Wireless and Mobile Systems, 3rd Edition, Cengage Learning, 2011. (TK5103.2.A277 2011)
2. Simon R. Saunders, and Alejandro Aragon-Zavala, Antennas and Propagation for Wireless Communication Systems, 2nd Edition, John Wiley, 2007. (TK7871.6.S257 2007)

References

1. Rappaport Theodore S, Wireless Communications: Principles and Practice, 2nd Edition, Prentice-Hall, 2002. (TK5103.2.R221 2002)
2. Freeman Roger L, Radio System Design for Telecommunications, 3rd Edition, IEEE/Wiley-Interscience, 2007. (TK6553.F855 2007)
3. Garg Vijay Kumar, Wireless Communications and Networking, Elsevier Morgan Kaufmann, 2007, (TK5103.2.G231WC)

EE4189 SPREAD SPECTRUM COMMUNICATIONS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3012

Contents

Advanced signal analysis and noise. Generation of spreading sequences. Fundamentals of spread spectrum. Analysis of spread spectrum systems. Applications of spread spectrum systems.

Textbook

1. Valery P. Ipatov, Spread Spectrum and CDMA: principles and applications, John Wiley, 2005. (TK5103.45.I64)

References

1. Ziemer Rodger E and Peterson Roger L, Introduction to Digital Communication, Prentice-Hall, 2001. (TK5103.7.Z66I)
2. Lathi Bhagwandas Pannalal, Modern Digital and Analog Communication Systems, 4th Edition, Oxford University Press, 2009. (TK5101.L352 2009)
3. Sklar Bernard, Digital Communications: Fundamentals and Applications, 2nd Edition, Prentice-Hall, 2001. (TK5103.7.S628 2001)
4. Dixon Robert Clyde, Spread Spectrum Systems: With Commercial Applications, 3rd Edition, John Wiley, 1994. (TK5102.5.D621 1994)

EE4190 INTRODUCTION TO MODERN RADAR

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE2010

Contents

Introduction. Detection, Clutter, Matched Filtering & Doppler. Hardware Considerations & Electromagnetic Propagation. Synthetic Aperture Radar. Software Defined Radar (SDR) Concept and Demonstration. Array Beamforming and Space-time Adaptive Processing. Introduction to Target Tracking and Tracking Algorithms. Radar Variants and Trends.

Textbook

1. Stimson George W, Introduction to Airborne Radar, 2nd Edition, SciTech Publishing, 1998. (TL696.R2S859 1998)

References

1. Richards Mark A, Principles of Modern Radar: Basic Principles, SciTech Publishing, 2010. (TK6575.P957 V1)
2. Mahafza Bassem R, Radar Signal Analysis and Processing Using MATLAB, CRC Press, 2009. (TK6575.M214RS)
3. Wirth W, Radar Techniques Using Array Antennas, IEE, 2001. (TK6590.A6R124T)
4. Skolnik Merrill, Introduction to Radar Systems, 3rd Edition, McGraw-Hill, 2001. (TK6575.S628 2001)

5. Carrara Walter G, Goodman Ron S and Majewski Ronald M, Spotlight Synthetic Aperture Radar: Signal Processing Algorithms, Artech House, 1995. (TK6592.S95C313)

EE4207 CONTROL ENGINEERING DESIGN

Academic Units: 2

Contact Hours (per week) | Lecture – 13 ; Laboratory – 26

Pre-requisite | -

Contents

Discrete-time control systems. Z-transform. Root locus method. Frequency response method. State space design. Pole placement. State observers. Servo systems.

References

1. Maciejowski Jan Marian, Predictive Control with Constraints, Prentice-Hall, 2002.(TJ217.6.M152)
2. Gopal M, Digital Control and State Variable Methods: Conventional and Neural-Fuzzy Control Systems, 3rd Edition, TaTa-McGraw Hill, 2009. (TJ223.M53G659D 2008).

EE4208 INTELLIGENT SYSTEM DESIGN

Academic Units: 2

Contact Hours (per week) | Lecture – 13 ; Laboratory – 26

Pre-requisite | -

Contents

This module covers the design of intelligent systems such as intelligent automation systems, neurofuzzy systems and intelligent vision systems. Currently, the focus is on the design of computer vision systems.

Reference

1. Haralick Robert M and Shapiro Linda G, Computer and Robot Vision, Addison-Wesley, 1993. (TA1632.H254)

EE4265 PROCESS CONTROL SYSTEMS

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | EE3011

Contents

Introduction. Process models. Feedback control systems. Complex control structures. Feedback controller design for time delay systems. Advanced control techniques. Process control applications.

Textbook

1. Seborg Dale E, Edgar Thomas F and Mellichamp Duncan A, Process Dynamics and Control, 3rd Edition, Wiley, 2011. (TP155.75.S443 2011)

References

1. Ogunnaike Babatunde A and Ray W Harmon, Process Dynamics, Modeling and Control, Oxford University Press, 1994. (TP155.75.G35)
2. Luyben Michael L and Luyben William L, Essentials of Process Control, McGraw-Hill, 1997. (TP155.75.L978)
3. Shinskey F Greg, Process Control Systems: Application, Design and Tuning, 4th Edition, McGraw-Hill, 1996. (TP155.75.S556 1996)

EE4266 COMPUTER VISION

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | -

Contents

Image representation. Preprocessing techniques. Segmentation and representation. Recognition and machine intelligence. Machine vision applications.

Textbook

1. Gonzalez Rafael C, Digital Image Processing, 3rd Edition, Prentice-Hall, 2008. (TA1632.G643 2008)

References

1. Awcock G J and Thomas Ray, Applied Image Processing, McGraw-Hill, 1996. (TA1637.A965)
2. Duda Richard O, Hart Peter E and Stork David G, Pattern Classification, 2nd Edition, John Wiley, 2001. (Q327.D844 2001)

EE4268 ROBOTICS AND AUTOMATION

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | -

Contents

Introduction to robotics. Coordinate transformation and kinematics. Trajectory planning. Control techniques. Sensors and devices. Robot applications.

Textbook

1. Craig John J, Introduction to Robotics: Mechanics and Control, 3rd Edition, Prentice-Hall, 2005. (TJ211.C886 2005)

References

1. Schilling Robert J, Fundamentals of Robotics: Analysis and Control, Prentice-Hall, 1990. (TJ211.S334)
2. Niku Saeed B, An Introduction to Robotics Analysis, Systems, Applications, Prentice-Hall, 2001. (TJ211.N694)

EE4273 DIGITAL CONTROL SYSTEMS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3011

Contents

Signal conversion and reconstruction. Analysis and design of digital control systems. State variable techniques and implementation issues.

Textbooks

1. Ogata Katsuhiko, Discrete-Time Control Systems, 2nd Edition, Prentice-Hall, 1995. (QA402.G34 1995)
2. Franklin Gene F, Powell J David and Workman Michael L, Digital Control of Dynamic Systems, 3rd Edition, Addison-Wesley, 1998. (TJ223.M53F831 1998)

References

1. Astrom Karl Johan and Wittenmark Bjorn, Computer-Controlled Systems: Theory and Design, 3rd Edition, Prentice-Hall, 1997. (TJ213.A859 1997)
2. Phillips Charles L and Nagle H Troy, Digital Control System Analysis and Design, 3rd Edition, Prentice-Hall, 1995. (TJ223.M53P558 1995)
3. Gopal M, Digital Control and State Variable Methods: Conventional and Neural-Fuzzy Control Systems, 3rd Edition, Tata-McGraw Hill, 2008. (TJ223.M53G659D 2008)

EE4285 COMPUTATIONAL INTELLIGENCE

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Introduction. Fundamental concepts and models of artificial neural systems. Neural network learning paradigms and architectures. Applications of artificial neural networks. Fuzzy sets. Fuzzy inference mechanisms, applications of fuzzy logic. Genetic algorithms and its applications in optimization.

Textbooks

1. Buckley, James J and Eslami, Esfandiar, An introduction to fuzzy logic and fuzzy sets, Physica-Verlag, 2002. (QA76.9.S63B924)
2. Zurada Jacek M, Introduction to Artificial Neural Systems, West, 1992. (QA76.87.Z96)
3. Back Thomas, Evolutionary Algorithms in Theory and Practice: Evolution Strategies, Evolutionary Programming, Genetic Algorithms, Oxford University Press, 1996. (QA402.5.B365)

References

1. Terano Toshiro, Asai Kiyoji and Sugeno Michio, Fuzzy Systems Theory and its Applications, Academic Press, 1992. (QA248.T315)
2. Lin Ching Tai and Lee C S George, Neural Fuzzy Systems: A Neuro-Fuzzy Synergism to Intelligent Systems, Prentice-Hall, 1996. (TJ217.25.L735)

EE4303 MIXED-SIGNAL IC DESIGN

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | EE3003/EE3019

Contents

This design course is based on the use of standard fabrication technologies (e.g., CMOS and BiCMOS) to realize analog and digital functions on integrated circuits. Students learn practical circuit design techniques as well as device characteristics and the theory of circuit synthesis and analysis. A mixed-signal circuit design project of medium complexity is included to enhance student's learning.

Textbook

1. Sansen Wiley M C, Analog Design Essentials, Springer, 2006. (TK7874.654.S229)

References

1. Baker R Jacob, CMOS: Circuit Design, Layout, and Simulation, 3rd Edition, IEEE Press/Wiley, 2010. (TK7871.99.M44B168 2010)
2. Gray Paul R, Analysis And Design Of Analog Integrated Circuits, 5th Edition, Wiley, 2009. (TK7874.G781 2009)

EE4304 RADIO FREQUENCY INTEGRATED SYSTEM DESIGN

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | EE3003/EE3019

Contents

RF integrated systems. Design and simulation of RF circuits.

Textbook

1. Razavi Behzad, RF Microelectronics, 2nd Edition, Pearson Education, 2012. (TK6560.R278 2012)

References

1. Yeo Kiat Seng, Do Manh Anh and Boon Chirn Chye, Design of CMOS RF Integrated Circuits and Systems, World Scientific, 2010. (TK7874.78.Y46)
2. Couch Leon W, Digital and Analog Communication Systems, 8th Edition, Pearson/Prentice-Hall, c2013. (TK5101.C853 2013)
3. Razavi Behzad, Design of Analog CMOS Integrated Circuits, McGraw-Hill, 2001. (TK7874.654.R278)

EE4305 DIGITAL DESIGN WITH HDL

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | EE2004

Contents

Digital design using hardware description language. Design practice.

Textbook

1. Yalamanchili Sudhakar, VHDL: A Starter's Guide, 2nd Edition, Pearson/Prentice Hall, 2005. (TK7885.7.Y16 2005)

References

1. Roth, Charles H and John Lizy Kurian, Digital Systems Design using VHDL, 2nd Edition, Thomson, 2008. (TK7888.4.R845D 2008)
2. Chu Pong P, RTL hardware design using VHDL: Coding for Efficiency, Portability and Scalability, John Wiley, 2006. (TK7868.D5C559)

EE4340 VLSI SYSTEMS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE2004

Contents

VLSI system architecture and memory management. Parallel processing. High speed synchronous and asynchronous design. System noise consideration. VLSI system verification and testability. System reliability.

Textbook

1. Dally William J and Poulton John W, Digital Systems Engineering, Cambridge University Press, 1998. (TK7888.3.D147)

References

1. Hayes John Patrick, Computer Architecture and Organization, 3rd Edition, McGraw-Hill, 1998. (QA76.9.A73H417 1998)
2. Mano M Morris and Kime Charles R, Logic and Computer Design Fundamentals, 4th Edition, Pearson/Prentice-Hall, 2008. (TK7888.4.M285 2008)
3. Stallings William, Computer Organization and Architecture: Designing for Performance, 9th Edition, Prentice-Hall, 2013. (QA76.9.C643S782 2013)
4. Rabaey Jan M, Chandrakasan Anantha and Borivoje Nikolic, Digital Integrated Circuits: A Design Perspective, 2nd Edition, Pearson Education, 2003. (TK7874.65.R112 2003)
5. Wolf Wayne, Modern VLSI Design: System-on-chip Design, 3rd Edition, Prentice Hall, 2002. (TK7874.65.W855 2002)

EE4341 ADVANCED ANALOG CIRCUITS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3003/EE3019

Contents

Wide-bandwidth amplifiers. Low noise circuits. Power amplifiers. Current-mode circuits. Active filters.

Textbook

1. Franco Sergio, Design with Operational Amplifiers and Analog Integrated Circuits, 3rd Edition, McGraw-Hill, 2002. (TK7874.F825 2002)

References

1. Toumazou Chris, Lidgey F J and Haigh David G, Analogue IC Design: The Current-Mode Approach, Peregrinus, 1990. (TK7874.A532)
2. Davidse J, Analogue Electronic Circuit Design, Prentice-Hall, 1991. (TK7874.D251A)
3. Gray Paul R, Analysis and Design of Analog Integrated Circuits, 5th Edition, John Wiley, 2009. (TK7874.G781 2009)
4. Sanchez-Sinencio Edgar and Andreou Andreas G, Low-Voltage/Low-Power Integrated Circuits and Systems: Low-Voltage Mixed Signal Circuits, IEEE Press, 1999. (TK7874.66.L922)

EE4343 RADIO FREQUENCY CIRCUITS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3003/EE3019

Contents

Radio-frequency input-circuits and impedance matching. Small-signal radio-frequency amplifiers. Mixers. RF power amplifiers. Oscillators. Phase-locked loop circuits.

Textbook

1. Ludwig Reinhold and Bretchko Pavel, RF Circuit Design: Theory and Applications, 2nd Edition, Prentice-Hall, 2008.

References

1. Smith Jack R, Modern Communication Circuits, 2nd Edition, McGraw-Hill, 1998. (TK6553.S651 1998)
2. White Joseph F, High Frequency Techniques : An Introduction to RF and Microwave Engineering, IEEE Press, 2004. (TK7876.W585H)
3. Wolaver Dan H, Phase-Locked Loop Circuit Design, Prentice-Hall, 1991. (TK7872.P38W848)

EE4344 ANALYSIS AND DESIGN OF INTEGRATED CIRCUITS

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | EE3003/EE3019

Contents

Basic Analog Building Blocks. Data Converters. Low-Voltage Low-Power Digital Circuits. Memories. Sequential and Self-Timed CMOS Circuits. Design Methodologies and Implementation Strategies.

Textbooks

1. Allen Phillip E and Holberg Douglas R, CMOS Analog Circuit Design, 3rd Edition, Oxford University Press, 2012. (TK7874.A428 2012)
2. Weste Neil H E and Harris David Money, CMOS VLSI Design: A Circuit and Systems Perspective, 4th Edition, Addison Wesley, 2011. (TK7874.W525 2011)

References

1. Rabaey Jan M, Chandrakasan Anantha P and Nikolic Borivoje, Digital Integrated Circuits: A Design Perspective, 2nd Edition, Pearson Education, 2003. (TK7874.65.R112 2003)
2. Lin Ming-Bo, Introduction to VLSI Systems: A Logic, Circuit and System Perspective, CRC Press, 2012 (TK7874.75.L735)
3. Sansen Wiley M C, Analog Design Essentials, Springer, 2006. (TK7874.654.S229)
4. Johns David A and Ken Martins, Analog Integrated Circuit Design, 2nd Edition, John Wiley & Sons, 2013. (TK7874.J65 2013)

EE4413 DSP SYSTEM DESIGN

Academic Units: 2

Contact Hours (per week) | 39

Pre-requisite | -

Contents

This course introduces the basic rules, procedures, techniques and components for designing a DSP system. The course also includes an assignment for the students to apply the knowledge and techniques learnt. DSP architectures, addressing mode, DSP fixed-point programming style, real-time implementation issues, DSP integrated development environment.

References

1. Mitra, Sanjit K, Digital Signal Processing : A Computer Based Approach, 4th Edition, McGraw-Hill, 2011. (TK5102.9.M684 2011)
2. Proakis John G and Manolakis Dimitris G, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Pearson Prentice-Hall, 2007. (TK5102.9.P932)
3. Kuo Sen M, Lee Bob H andTian Wenshun, Real-Time Digital Signal Processing: Implementations and Applications, 2nd Edition, John Wiley, c2006. (TK5102.9.K96R 2006)
4. Oppenheim Alan V, Schafer Ronald W, and Buck John R, Discrete-Time Signal Processing, 3rd Edition, Prentice-Hall, 2009.
5. Lapsley Phil, DSP Processor Fundamentals: Architectures and Features, IEEE Press, 1997. (TK5102.9.D811)
6. Ackenhusen John G, Real Time Signal Processing: Design and Implementation of Signal Processing Systems, Prentice-Hall, 1999. (TK5102.9A182)

EE4455 EMBEDDED SYSTEMS

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | EE3002

Contents

Introduction to embedded system and embedded processors. Hardware of embedded systems. Software of embedded systems. Real-Time embedded system. Embedded media processing components design. Standards.

Textbooks

1. Marilyn Wolf, Computers as Components: Principles of Embedded Computing System Design, 3rd Edition, Morgan Kaufmann, 2012. (QA76.9.S88W855 2012)
2. Gan Woon-Seng and Kuo Sen M, Embedded Signal Processing with the Micro Signal Architecture, Wiley- Interscience, 2007. (TK5102.9.G195)

References

1. Katz David J and Gentile Rick, Embedded Media Processing, Elsevier/Newnes, 2006. (TK5102.9.K19)
2. Noergaard Tammy, Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers, 2nd Edition, Elsevier/Newnes, 2013. (TK7895.E42N769 2013)
3. Wolf Wayne Hendrix, Computers as Components: Principles of Embedded Computing System Design, 3rd Edition, Morgan Kaufmann, 2012. (QA76.9.S88W855 2012)
4. Kuo Sen M and Gan Woon-Seng, Digital Signal Processors: Architectures, Implementations and Applications, Pearson Prentice Hall, 2005 (TK5102.9.K96)

EE4475 AUDIO SIGNAL PROCESSING

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | -

Contents

Fundamentals of human hearing. Room acoustics. 3-D sound synthesis. Sound compression.

Textbooks

1. Bosi Marina and Goldberg Richard E, Introduction to Digital Audio Coding and Standards, Kluwer Academic, 2003. (TK7881.4.B743)
2. Kuo Sen M and Gan Woon-Seng, Digital Signal Processors: Architectures, Implementations and Applications, Pearson Prentice-Hall, 2005. (TK5102.9.K96)
3. Gardner William G, 3-D Audio Using Loudspeakers, Kluwer Academic, 1998. (TK7881.83.G228)

References

1. Pohlmann Ken C, Principles of Digital Audio, 6th Edition, McGraw-Hill, 2011. (TK7881.4.P748 2011)
2. Watkinson John, The Art of Digital Audio, 3rd Edition, Focal Press, 2001. (TK7881.4.W336 2001)

EE4476 IMAGE PROCESSING

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Digital image fundamentals. Image transforms. Image enhancement. Image restoration. Image compression. Nonlinear image processing. Applications.

Textbook

1. Gonzalez Rafael C and Woods Richard E, Digital Image Processing, 3rd Edition, Prentice Hall, 2008. (TA1632.G643 2008)

References

1. Pratt William K, Digital Image Processing: PIKS Scientific Inside, 4th Edition, John Wiley, 2007. (TA1632.P917 2007)
2. Pitas Ioannis, Digital Image Processing Algorithms and Applications, John Wiley, 2000. (TA1637.P681)
3. Jain Anil K, Fundamentals of Digital Image Processing, Prentice-Hall, 1989. (TA1632.J25)

EE4478 DIGITAL VIDEO PROCESSING

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Fundamentals of digital video. Block-matching motion estimation and fast algorithms. Video coding basics. Video coding standards. Video streaming and processing. Applications.

Textbooks

1. Shi Yun Q and Sun Huifang, Image and Video Compression for Multimedia Engineering: Fundamentals, Algorithms, and Standards, 2nd Edition, CRC Press, 2008. (QA76.575.S555 2008)
2. Wang Yao, Ostermann Jeorn and Zhang Ya-Qin, Video Processing and Communications. Prentice Hall, 2002. (TK5105.2.W246)

References

1. Symes Peter, Digital Video Compression, McGraw-Hill, 2004. (TK6680.5.S986D)
2. Schaar Mihaela van der, Turaga Deepak S and Stockhammer Thomas, MPEG-4 Beyond Conventional Video Coding: Object Coding, Resilience, and Scalability, 1st Edition, Morgan & Claypool, 2006. (TK6680.5.S291)
3. Richardson Iain E G, The H.264 Advanced Compression: Standard, 2nd Edition, Wiley, 2010. (TK6680.5.R522 2010)
4. Tekalp A Murat, Digital Video Processing, Prentice-Hall, 1995. (TK6680.5.T266)
5. ISO/IEC 11172-2, Information Technology - Coding of Moving Pictures and Associated Audio for Digital Storage Media at up to about 1.5 Mbit/s, Part 2: Video, BSI, 1995. (QC100.B862 BS EN ISO/IEC 11172-2 1995)
6. ISO/IEC IS 13818-2, Information Technology - Generic Coding of Moving Pictures and Associated Audio Information: Video, 1995. (TK277.I85 ISO/IEC13818-2 1996(E))
7. ISO/IEC IS 14496, Information Technology - Coding of Audio-Visual Objects - Part 2: Visual, Geneva, 1999. (TK277.I85 ISO/IEC14496-2(E))

EE4483 ARTIFICIAL INTELLIGENCE AND DATA MINING

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Problem solving techniques. Machine learning and applications to data mining.

Textbooks

1. Luger George F, Artificial Intelligence : Structures and Strategies for Complex Problem Solving, 6th Edition, Addison-Wesley, 2009. (Q335.L951).
2. Dunham Margaret H, Data Mining Introductory and Advanced Topics, Pearson/Prentice-Hall, 2003. (QA76.9.D343D917)

References

1. Han Jiawei and Kamber Micheline, Data Mining: Concepts and Techniques, 3rd Edition, Elsevier / Morgan Kaufmann, 2012. (QA76.9.D343H233 2012, E-book)
2. Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2010. (Q335.R967A 2010)

EE4490 MULTIMEDIA SYSTEMS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Fundamentals of multimedia systems. Overview of digital image and video coding standards. Overview of digital audio coding standard. Multimedia communications. Multimedia applications.

Textbook

1. Li Ze-Nian and Drew Mark S, Fundamentals of Multimedia, Pearson Prentice-Hall, 2004. (QA76.575.L693)

Reference

1. Steinmetz Ralf and Nahrstedt Klara, Multimedia: Computing, Communications and Applications, Prentice-Hall, 1997. (QA76.575.S823 1997)

EE4503 POWER ENGINEERING DESIGN

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | EE3015 (non-BRC) or EE3010 & EE3015 (BRC)

Contents

In this design course, the students will apply the concepts of various power system analysis techniques and system performance criteria in designing a medium/low voltage transmission system and protection schemes for some typical industrial distribution networks. Students are required to carry out the detailed design with hands-on exercise and extensive use of computer simulation software. Students are also required to verify the results of the final design to meet specifications.

Textbooks

1. Kasikci Ismail, Analysis and Design of Low-voltage Power Systems: An Engineer's Field Guide, 1st Edition, Wiley-VCH, 2004. (TK1001.K19)
2. Blackburn J Lewis and Domin thomas J, Protective Relaying: Principles and Applications, 3rd Edition, CRC Press, 2007. (TK2861.B628 2007)

References

1. Code of Practice for Electrical Installations, (Singapore Standards, CP5 1998), Singapore Productivity and Standards Board, 1998. (QC100.S617 CP5 1998)
2. Anderson Paul M, Power System Protection, 1st Edition, McGraw-Hill, 1999. (TK1010.A548)

EE4504 DESIGN OF CLEAN ENERGY SYSTEMS

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | EE3015 (non-BRC) or EE3010 & EE3015 (BRC)

Contents

Clean and renewable energy sources. Wind energy turbines and systems. Solar photovoltaic devices and systems. System-level designs. Analytical design and analysis. Modelling and simulation. Hands-on sessions using commercial software. Comprehensive case studies of wind and solar energy systems.

Textbooks

1. Simões Marcelo Godoy and Farret Felix A, Renewable Energy Systems – Design and Analysis with Induction Generators, CRC Press, 2004. (TJ808.S593)
2. Green M A, Third Generation Photovoltaics Advanced Solar Energy Conversion, Springer, 2006.

Reference

1. Thomas Ackemann, Wind Power in Power Systems, John Wiley, 2005. (TK1541.W763)

EE4530 POWER SYSTEM ANALYSIS AND CONTROL

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE2005 (non-BRC) or EE3010 & EE3015 (BRC)

Contents

Power flows. Active power and frequency control. Reactive power and voltage control. Power system stability.

Textbook

1. Saadat Hadi, Power System Analysis, 3rd Edition, McGraw-Hill, 2010. (TK1001.S111 2010)

References

1. Weedy Birron Mathew and Cory Brian John, Electric Power Systems, 5th Edition, John Wiley, 2012. (TK1001.W394 2012)
2. Grainger John J and Stevenson William D, Power System Analysis, McGraw-Hill, 1994. (TK3001.G743)

EE4532 POWER ELECTRONICS AND DRIVES

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE2005 (non-BRC) or EE3010 & EE3015 (BRC)

Contents

Introduction to power electronic systems and devices. Uncontrolled and controlled rectifiers. Hard switching power converters. Principles and control of motor drives.

Textbooks

1. Mohan Ned, Undeland Tore M and Robbins William P, Power Electronics: Converters, Applications and Design, 3rd Edition, John Wiley, 2003. (TK7881.15.M697 2003)
2. Rashid M H, Power Electronics: Circuits, Devices & Applications, 3rd Edition, Pearson/Prentice Hall, 2004. (TK7881.15.r224 2004)

References

1. Krein Philip T, Elements of Power Electronics, 1st Edition, Oxford University Press, 1998. (TK7881.15.K92)
2. Erickson Robert Warren and Maksimovic Dragan, Fundamentals of Power Electronics, 2nd Edition, Kluwer Academic/Springer, 2001. (TK7881.15.E68 2001)

EE4533 POWER APPARATUS AND SYSTEM PROTECTION

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | EE2005 (non-BRC) or EE3015 (BRC)

Contents

Power apparatus and transients. High voltage testing and maintenance. Fault analysis. Protection of distribution systems. Protection of power apparatus.

Textbooks

1. Haddad A and Warne D F, Advances in High Voltage Engineering, IEE (IEE Power and Energy Series), 2004. (TK153.A244)
2. Blackburn J Lewis, Protective Relaying: Principles and Applications, 4th Edition, CRC Press, 2013.

References

1. Bergen Arthur R and Vittal Vijay, Power System Analysis, 2nd Edition, Prentice-Hall, 2000. (TK1001.B495 2000)
2. Grainger John J and Stevenson William D, Power System Analysis, McGraw-Hill, 1994. (TK3001.G743)
3. Naidu M S and Kamaraju V, High Voltage Engineering, 2nd Edition, McGraw-Hill, 1996. (TK3001.N155 1996)
4. Ram Badri and Vishwakarma D N, Power System Protection and Switchgear, 2nd Edition, McGraw-Hill, 2011. (Revised Edition) (TK2861.R165)

EE4534 MODERN DISTRIBUTION SYSTEMS WITH RENEWABLE RESOURCES

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | EE3015 (non-BRC) or EE3010 & EE3015 (BRC)

Contents

Operation of distribution systems. Power quality. Solar power systems. Wind power systems.

Textbooks

1. Pabla A S, Electric Power Distribution, 6th Edition, McGraw-Hill, 2011. (TK3001.P112e 2011)
2. Masters Gilbert M, Renewable and Efficient Electric Power Systems, 2nd Edition, John Wiley, 2013. (TK1005.M423 2013)

References

1. Dugan Roger C, McGranaghan M F, Santoso S and Beaty H Wayne, Electrical Power Systems Quality, 3rd Edition, McGraw-Hill, 2012. (TK1010.D866 2012)
2. Boyle Godfrey, Renewable Energy: Power for A Sustainable Future, 3rd Edition, Oxford University Press, 2012. (TJ808.R411re 2012)

EE4613 CMOS PROCESS AND DEVICE SIMULATION

Academic Units: 2

Contact Hours (per week) | Lecture – 13 ; Laboratory – 26

Pre-requisite | EE3013

Contents

Virtual wafer fabrication. Virtual device characterization. Virtual process integration.

References

1. Arora Narain, MOSFET Modeling for VLSI Simulation: Theory and Practice, World Scientific, 2007. (TK7871.95.A769M)
2. Tsividis Yannis and McAndrew Colin, Operation and Modeling of the MOS Transistor, 3rd Edition, Oxford University Press, 2011. (TK7871.99.M44T882 2011)
3. Kramer Kevin M and Hitchon W Nicholas G, Semiconductor Devices: A Simulation Approach, Prentice-Hall, 1997. (TK7871.85.K89)

EE4614 DEVICE PARAMETER EXTRACTION AND LAYOUT IMPLEMENTATION

Academic Units: 2

Contact Hours (per week) | Lecture – 13 ; Laboratory – 26

Pre-requisite | EE3013

Contents

Virtual device characterization. Transistor parameter extraction. Circuit simulation and mask layout design.

References

1. Synopsis TCAD Manual – MEDICI.
2. Schroder Dieter K, Semiconductor Material and Device Characterization, 3rd Edition, IEEE Press, 2006. (QC611.S381 2006)
3. Liou Juin J, Ortiz-Conde Adelmo and Garcia-Sanchez F, Analysis and Design of MOSFETs – Modeling, Simulation, and Parameter Extraction, Kluwer Academic Publishers, 1999. (TK7871.95 L763)

4. Rabaey Jan M, Chandrakasan Anantha, and Nikolic Borivoje, Digital Integrated Circuits: A Design Perspective, 2nd Edition, Pearson Education, 2003. (TK7874.65.R112 2003)

EE4645 MICROFABRICATION ENGINEERING

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3013

Contents

Crystal growth and wafer preparation. Vacuum science and plasma. Rapid thermal processing. Advanced deposition techniques. Process integration. Semiconductor characterization techniques. IC manufacturing.

Textbook

1. Stephen A. Campbell, Fabrication Engineering at the Micro- and Nanoscale, 4th Edition, Oxford University Press, 2013. (TK7871.85.C191f 2013)

References

1. Mahajan Subhash and SreeHarsha K S, Principles of Growth and Processing of Semiconductors, WCB/McGraw-Hill, 1999. (TK7871.85.M214)
2. Van Zant Peter, Microchip Fabrication: A Practical Guide to Semiconductor Processing, 6th Edition, McGraw-Hill, 2013. (TK7871.85.V217 2013)
3. Ghandhi Sorab Khushro, VLSI Fabrication Principles: Silicon and Gallium Arsenide, 2nd Edition, John Wiley, 1994. (TK7874.G411 1994)

EE4646 VLSI TECHNOLOGY

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3013

Contents

Advanced MOS structures and process technology. Advanced bipolar transistors and process technology. MOS scaling rules and small geometry effects. CMOS latchup and isolation.

Textbooks

1. Wolf Stanley and Tauber Richard N, Silicon Processing for the VLSI Era, Vol.1, 2nd Edition, Lattice Press 2000 (TK7874.W855 2000 V1)
2. Chang C Y and Sze S M, ULSI Devices, John/Wiley 2000 (TK7874.76.U46D)

References

1. Kuo James B and Lin Shih-Chia, Low-Voltage SOI CMOS VLSI Devices and Circuits, Wiley, 2001. (E-Book) (TK7874.66.K96V)
2. Houssa Michel, High-k Gate Dielectrics, Institute of Physics, 2004. (TK7871.99.M44H638K)
3. Sze S M, Semiconductor Devices, Physics and Technology, 3rd Edition, John Wiley, 2012. (TK7871.85.S997 2012)
4. Neamen Donald A, Semiconductor Physics and Devices: Basic Principles, 4th Edition, McGraw-Hill, 2012. (QC611.N348 2012)

EE4647 MICROELECTRONIC DEVICES

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE2003

Contents

Bipolar devices. MOS physics. MOSFET device characteristics and modelling. Introduction to heterojunction devices.

Textbooks

1. Sze S M, Semiconductor Devices, Physics and Technology, 3rd Edition, John Wiley, 2012. (TK7871.85.S997 2012)
2. Neamen Donald A, Semiconductor Physics and Devices: Basic Principles, 4th Edition, McGraw-Hill, 2012. (QC611.N348 2012)

Reference

1. Dimitrijev Sima, Understanding Semiconductor Devices, Oxford University Press, 2000 (TK7871.85.D582)

EE4648 FLAT PANEL DISPLAY TECHNOLOGIES

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE2003

Contents

Overview of display technologies. Ergonomics of displays. Liquid crystal cell. Liquid crystal display technologies. Electroluminescent devices. Plasma displays. Field emission displays. Thin film transistors. Recent advances in display technologies.

References

1. Keller Peter A, Electronic Display Measurement: Concepts, Techniques, and Instrumentation, John Wiley 1997. (TK7882.I6K29)
2. Yeh Pochi and Gu Claire, Optics of Liquid Crystal Displays, 2nd Edition, John Wiley 2010. (TK7872.L56Y43 2010)
3. Sherr Sol, Applications for Electronic Displays Technologies and Requirements, John Wiley, 1998. (TK7882.I6S553 1998)
4. Lueder Ernst, Liquid Crystal Displays : Addressing Schemes and Electro-Optical Effects, 2nd Edition, John Wiley, 2010. (TK7872.L56L948C)

EE4694 IC RELIABILITY AND FAILURE ANALYSIS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3013

Contents

Basic reliability engineering concept. Statistical aspect of reliability and data handling. Microelectronic device failure mechanisms. Failure analysis techniques and instrumentation.

Textbook

1. Ebeling Charles E, An Introduction to Reliability and Maintainability Engineering, 2nd Edition, Waveland Press, 2010. (TA169.E15 2010)

References

1. Ohring Milton, Reliability and Failure of Electronic Materials and Devices, Academic Press, 1998. (TK7870.23.H38)
2. O'Connor Patrick D T and Newton David, Practical Reliability Engineering, 5th Edition, Wiley, 2012 (TS173.C18 2012)

EE4717 WEB APPLICATION DESIGN

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | -

Contents

This design course will equip students with principles, knowledge and skills for the design and construction of web-enabled Internet applications. It deals with challenges raised in wide-area distributed computing, including persistence, concurrency and transaction, as well as technologies for creating, managing, and tracking web-interaction state in the environments where the connections are inherently unreliable and protocols are inherently stateless.

References

1. Douglas K. Van Duyne; James A. Landay; Jason I. Hong, The Design of Sites, 2nd Edition, Prentice Hall PTR, 2006. (TK5105.888.V36)
2. Terry Felke-Morris, Basics of Web Design: HTML5 & CSS3, 2nd Edition, Addison-Wesley Longman, 2013. ISBN: 978-0-13-312891-8
3. Welling Luke, Thomson Laura, PHP and MySQL Web Development, 4th Edition, Addison Wesley, 2009. (QA76.73.P224W452 2009)
4. Larry Ullman, Modern JavaScript: Develop and Design, Peachpit Press, 2012, ISBN: 978-0321812520

EE4718 ENTERPRISE NETWORK DESIGN

Academic Units: 3
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | EE3017

Contents

This course covers network technologies and protocols, network planning and design methodologies. Besides acquiring the theoretical background in enterprise networking, students will learn to set up, configure and interconnect an IP network in the lab sessions. Network monitoring and management tools will also be introduced to the students.

References

1. Leon-Garcia Alberto and Widjaja Indra, Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw-Hill, 2004. (TK5101.L579 2004)
2. Kurose James F and Ross Keith W, Computer Networking: A Top-Down Approach, 6th Edition, Pearson, 2013. (TK5105.875.I57K96 2013)
3. CCIE Fundamentals: Network Design and Case Studies, 2nd Edition, Cisco Press, 2002. (TK5105.5.C386)
4. Priscilla Oppenheimer, Top-Down Network Design, 3rd Edition, Cisco Press, 2011. (TK5105.5.P62 2011)

EE4756 COMPUTER ARCHITECTURE

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Fundamental of computer design. Instruction set architecture. Memory-system architecture. Buses, storage devices and I/O system. RISC design. Pipelining.

Textbook

1. Hennessy John L and Patterson David A, Computer Architecture: A Quantitative Approach, 5th Edition, Morgan Kaufmann, 2012. (QA76.9.A73H515 2012).

References

1. Hennessy John L and Patterson David A, Computer Architecture: A Quantitative Approach, 2nd Edition, Morgan Kaufmann, 1996. (QA76.9.A73P317 1996)
2. Patterson David A and Hennessy John L, Computer Orgnaization and Design: The Hardware/Software Interface, 4th Edition, Elsevier/Morgan Kaufmann, 2009. (QA76.9.C643P317 2009)
3. Baron Robert J and Higbie Lee, Computer Architecture, Addison-Wesley, 1992. (QA76.9.A73B265)

EE4758 COMPUTER SECURITY

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Introduction. Secret/public-key cryptosystems. Secure protocols. Electronic election and digital money. Intrusion detection and database security.

Textbook

1. Stallings William, Cryptography and Network Security: Principles and Practice, 6th Edition, Pearson/Prentice- Hall, 2013. (TK5105.59.S782C 2013)

References

1. Bishop Matt, Introduction to Computer Security, Addison-Wesley, 2004. (QA76.9.A25B622T)
2. Pieprzyk Josef, Hardjono Thomas and Seberry Jennifer, Fundamentals of Computer Security, Springer, 2003. (QA76.9.A25P614)

EE4761 COMPUTER NETWORKING

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | EE3017

Contents

Computer network architecture and services. Internetworking protocols and routing. Transport protocols. Application services and multimedia networking.

Textbook

1. Kurose James F and Ross Keith W, Computer Networking: A Top-Down Approach, 6th Edition, Addison-Wesley, c2013. (TK5105.875.I57K96 2013)

References

1. Leon-Garcia Alberto and Widjaja Indra, Communication Networks: Fundamental Concepts and Key Architectures, 2nd Edition, McGraw-Hill, 2004. (TK5101.L579 2004)
2. Stallings William, Data and Computer Communications, 9th Edition, Pearson/Prentice-Hall, c2011. (TK5105.S782 2011)
3. Comer Douglas E, Internetworking with TCP/IP, 5th Edition, Pearson Prentice-Hall, 2006. (TK5105.585.C732 2006)

EE4791 DATABASE SYSTEMS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Introduction to database and data modelling. Logical database design and the relational model. The structured query language (SQL). Physical database design. Database administration. Client/server database. Data warehousing.

Textbook

1. Hoffer Jeffrey A, Ramesh V and Topi Heikki, Modern Database Management, 11th Edition, Pearson/Prentice-Hall, 2013. (QA76.9.D3M143 2013)

References

1. Connolly Thomas M and Begg Carolyn E, Database Systems: A Practical Approach to Design, Implementation, and Management, 5th Edition, Addison-Wesley, 2010. (QA76.9.D26C752 2010)
2. Elmasri Ramez and Navathe Shamkant, Fundamentals of Database Systems, 6th Edition, Pearson Addison-Wesley, 2011. (QA76.9.D3E48 2011)
3. Date C J, An Introduction to Database Systems, 8th Edition, Addison-Wesley, 2004. (QA76.9.D3D232 2004)
4. Coronel Carlos, Morris Steven and Rob Peter, Database Systems: Design, Implementation, and Management, 9th Edition, Course Technology, 2011. (QA76.9.D26R628 2011)

EE4838 LASER ENGINEERING AND APPLICATIONS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Laser fundamentals. Laser cavities. Laser oscillation. Laser techniques. Design of laser systems. Laser applications in sensing, metrology and data storage. Laser applications in industry. Laser applications in medicine and biology.

Textbook

1. Svelto Orazio, Principles of Lasers, 5th Edition, Springer, 2010.

References

1. Graham-Smith Francis Sir, King Terry A and Wilkins Dan, Optics and Photonics: An Introduction, 2nd Edition, John Wiley, c2007. (QC446.2.G742 2007)
2. Vij D R and Mahesh K, Medical Applications of Lasers, Kluwer Academic, 2002. (R857.L37M489)

EE4839 FIBRE OPTIC COMMUNICATIONS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Introduction to Fibre Optic Communications. Optical Fibre Characteristics. Light Sources, Transmitters, Receivers, Regenerators and Amplifiers. Passive and Active Components. System Concepts and System Design. Optical Networks.

Textbook

1. Hecht Jeff, Understanding Fiber Optics, 5th Edition, Pearson/Prentice-Hall 2006. (TA1800.H447 2006)

References

1. Dutton Harry J R, Understanding Optical Communications, Prentice-Hall, 1998. (TK5103.59.D981)
2. Palais Joseph C, Fiber Optic Communications, 5th Edition, Pearson/Prentice-Hall, 2005. (TK5103.59.P154 2005)
3. Derickson Dennis, Fiber Optic Test and Measurement, Prentice-Hall, 1998. (TK5103.59.D433)
4. Ramaswami Rajiv and Sivarajan Kumar N, Optical Networks: A Practical Perspective, 3rd Edition, Morgan Kaufmann, 2008.

EE4840 BIOPHOTONICS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

Fundamentals of Biophotonics, Bioimaging Principles and Techniques, Optical Biosensors, Laser-Photomedicine, Applications of Biophotonics.

Textbook

1. Prasad Paras N, Introduction to Biophotonics, Wiley-Interscience, 2003. (QH515.P911)

References

1. Tözeren Aydin and Byers Stephen W, New Biology for Engineers and Computer Scientists, Pearson/Prentice Hall, 2004. (QH506.T314)
2. Niemz Markolf H, Laser-Tissue Interactions [electronic resource]: Fundamental and Applications, 3rd Edition, Springer, 2007.
3. Vo-Dinh Tuan, Biomedical Photonics Handbook, CRC Press, 2003. (R857.O6.B615B)

EE4901 BIOMEDICAL CONTROL SYSTEM DESIGN

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | -

Contents

This design course is an introduction to biomedical system modeling and control, focusing on the synthesis of control techniques for biomedical systems. The musculoskeletal and cardiovascular systems will be used as illustrative examples.

References

1. Khoo Michael C K, Physiological Control Systems : Analysis, Simulation and Estimation, IEEE Press, 2000. (QP33.6.M36K45)
2. Kuo Benjamin C and Golnaraghi Farid, Automatic Control Systems, 9th Edition, John Wiley, 2008.
3. Little John N, Control System Toolbox for Use with MATLAB : User's Guide, The Math Works, Inc. 1998. (QA297.C764)

EE4902 DESIGN OF MEDICAL INFORMATION PROCESSING SYSTEMS

Academic Units: 2
Contact Hours (per week) | Lecture – 13 ; Laboratory – 26
Pre-requisite | -

Contents

This module is on the design of software/hardware systems for biomedical signal and image processing and analysis.

References

1. Bruce Eugene N, Biomedical Signal Processing and Signal Modeling, John Wiley, 2001. (R857.S47B886)
2. Proakis John G and Manolakis Dimitris G, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Pearson Prentice-Hall, 2007. (TK5102.9.P932)
3. Blake Andrew and Isard Michael, Active Contours: The Application of Techniques from Graphics, Vision, Control Theory and Statistics to Visual Tracking of Shapes in Motion, Springer, 1998. (TA1634.B636)

EE4903 PHYSIOLOGICAL SYSTEMS ANALYSIS

Academic Units: 3
Contact Hours (per week) | Lecture – 26 ; Tutorial – 13
Pre-requisite | -

Contents

System modelling, Control and analysis. The respiratory system. The cardiovascular system. The neuromuscular system. The renal system.

References

1. Widmaier Eric P, Raff Hershel, Strang Kevin T and Vander Arthur J, Vander's Human Physiology : The Mechanisms of Body Function, 13th Edition, McGraw-Hill, 2014. (QP34.5.V228 2014)
2. Khoo Michael C K, Physiological Control Systems: Analysis, Simulation, and Estimation, IEEE Press, 2000. (QP33.6.M36K45)
3. Marieb Elaine Nicpon, Essentials of Human Anatomy and Physiology, 10th Edition, Benjamin Cummings, 2011. (QP34.5.M334 2011)
4. Silverthorn Dee Unglaub, Human Physiology : An Integrated Approach, 6th Edition, Pearson/Benjamin Cummings, 2013. (QP34.5.S587 2013)

EE4904 BIOMEDICAL INSTRUMENTATION

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | -

Contents

Introduction to biomedical instrumentation. Biopotential electrodes. Electrocardiography. Blood pressure, heart sounds and blood flow. Respiratory system measurements. Instrumentation for medical imaging. Therapeutic devices. Electrical safety in hospitals.

Textbooks

1. Webster John G and Clark John W, Medical Instrumentation: Application and Design, 4th Edition, John Wiley, 2010. (R856.M489 2010)
2 Carr, Joseph J and Brown John M, Introduction to Biomedical Equipment Technology, 4th Edition, Prentice Hall 2001. (R856.C311 2001)

References

1. Brown B H, Medical Physics and Biomedical Engineering, Institute Of Physics, 1999. (R895.M489)
2. Bushberg Jerrold T, Seibert J A, Leidholdt E M and Boone J M, The Essential Physics of Medical Imaging, 2nd Edition, Lippincolt Williams & Wilkins, 2002. (RC78.7.D53E78)
3. Ganong William F, Ganong's Review of Medical Physiology, 24th Edition, McGraw-Hill Medical, 2012.

EE4905 BIOMEDICAL SIGNAL PROCESSING

Academic Units: 3

Contact Hours (per week) | Lecture – 26 ; Tutorial – 13

Pre-requisite | -

Contents

Introduction to biomedical signals. Acquisition and modelling of biomedical signals. Digital filters with applications to biomedical signals. Power spectral density (PSD) estimation. Non-stationary biomedical signal processing. Case study.

References

1. Bruce Eugene N, Biomedical Signal Processing and Signal Modeling, John Wiley, 2001. (R857.S47B886)
2. Northrop Robert B, Signals and Systems Analysis in Biomedical Engineering, 2nd Edition, CRC Press, 2010. (R856.N877 2010)
3. Proakis John G and Manolakis Dimitris G, Digital Signal Processing: Principles, Algorithms and Applications, 4th Edition, Pearson Prentice-Hall, 2007. (TK5102.9.P932)
4. Webster John G and Clark John W, Medical Instrumentation: Application and Design, 4th Edition, John Wiley, 2010. (R856.M489 2010)