ELECTRICAL AND ELECTRONIC ENGINEERING [AY2016/2017]

EEE GER Courses

EE8061 - INNOVATION AND TECHNOLOGY MANAGEMENT

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

The course aims to provide a broad understanding of the dynamics of technological development through innovation and the related management issues and practices.

Contents

Overview. Patterns of technology development. External environment. Internal environment and processes. Financial fundamentals, funding and risk management.

Student Assessment

- Continuous Assessment
- Written Examination

Textbook

1. Burgelman et al. Strategic Management of Technology and Innovation 4th Edition, McGraw-Hill, 2004.
2. Dorf Richard C and Byers Thomas H, Technology Ventures : from Idea to Enterprise, 4th Edition, McGraw-Hill, 2014.

References

1. Tidd et al. Managing Innovation, Wiley 1997

EE8064 - INTELLECTUAL PROPERTY FOR ELECTRONIC ENGINEERS

Academic Units | 3
Contact Hours | Lectures (26); Tutorials (12)
Pre-requisite | -

Learning Objective

The course aims to equip students with essential knowledge about Intellectual Property (IP) and its significance in the electronics/semiconductor/IC design industry. There is a need to move towards innovation and enterprise, and research and development to rejuvenate future economic growth. The knowledge-intensive electronics industry is one such area that provides a realm for innovation, and therefore, its chemistry with the IP Law is important. The search for new and more innovative electronic gadgets can continue to be pursued only by acquiring legal protection via IP rights. As a result, students should equip themselves with substantial understanding of the numerous forms of IP and the governing legal principles to efficiently protect and exploit their own inventions, on top of thriving on the ownership of IP.

Contents

Significance of the electronics industry. Intellectual property rights (IPRS). Ownership and commercial dealing. Case studies.

Student Assessment

- Continuous Assessment
- Written Examination

Textbook

1. Yeo Kiat Seng, Ng Kim Tean, Kong Zhi Hui and Dang Bee Yoke, Intellectual Property for Integrated Circuits, J. Ross, 2010. (K1401.I61PN)

References

1. Rockman Howard B, Intellectual Property Law for Engineers and Scientists, John Wiley, 2004. (KF2979.R683)
2. Ng-Loy, Wee Loon, Law of Intellectual Property of Singapore, 2nd Edition, Sweet & Maxwell, 2014

EE8066 - HAPPINESS 101

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

Happiness 101 is the scientific study of the strengths and virtues that enable individuals and communities to thrive and not just survive. This field is founded on the belief backed by Positive Psychology empirical studies that people can lead meaningful and fulfilling lives by cultivating what is best within themselves, and to enhance their happier experiences of love, work, and play.

Contents

Specifically the course is designed to: (a) Understand the fundamental ideas of Positive Psychology - and how these ideas can radically change the way we relate to ourselves and others; (b) Increase the "positivity ratio" as a means toward higher levels of creativity, motivation, health, and overall success - in individuals, groups, and organizations; (c) Use a variety of scientifically proven techniques from within the Positive Psychology toolbox that can lead to lasting change rather than a temporary high; (d) Practice the art and science of effective communication - how to present ideas, with authenticity, to individuals and groups; (e) Understand the key drivers of healthy and happy interpersonal relationships, and learn how to apply this understanding to one's own and others' relationships; (f) Practice and learn a variety of mind-body techniques that help enhance physical and mental health.

Student Assessment

- Continuous Assessment
- Written Examination

Textbook

1. Steve Baumgardner & Marie Crothers, Positive Psychology, Pearsons, 2014.

EE8067 - CERAMICS IN HISTORY, ARTS, GEMSTONES, ENVIRONMENT, AND MODERN LIFE

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | 'O' Level Physics or equivalent

Learning Objective

Ceramics have a wide range of forms such as rocks, soils, sands, gemstones, architecture-blocks, and as various functional materials from insulator to semiconductor to superconductor, piezoelectrics, ferroelectrics, ferromagnetics, optical ceramics, etc. This course will introduce students to the basic concepts and applications in electrical, electronic, optical, energy, civil, environment and polution control areas and allow them to learn the role of ceramics in history, arts, social and cultural development, and appreciate the fact that we live in, touch on, and use ceramics in our daily modern life.

Contents

Definition of ceramics and overview. Ceramics in History and Art. Fundamental Concepts. Jewelleries and Gemstones. Ceramics in Civil and Environment. Ceramics in Electrical and Electronic devices, Science, Technology and Applications of ceramics in modern life.

Student Assessment

- Continuous Assessment
- Written Examination

Textbooks

1. Richerson, David W, The Magic of Ceramics [Electronic Resource], 2nd Edition, Wiley, 2012.
2. Hench L L and West J K, Principles of Electronic Ceramics, Wiley, 1990. (TK7871.15.C4H494)

References

1. Kingery W D, The Changing Roles of Ceramics in Society : 26,000 B.P. to the Present, American Ceramic Society, 1990. (TP791.C456)
2. Callister William D and Rethwisch David G, Materials Science and Engineering : An Introduction, 9th Edition, John Wiley, 2014. (TA403.C162 2014)
3. Nelson, Glenn C and Richard Burkett, Ceramics : A Potter's Handbook, Wadsworth/Thomson Learning, 2002. (TP807.N426)
4. Price Monica, Decorative Stone : The Complete Sourcebook, Thames & Hudson, 2007. (TN950.P946)

EE8084 - CYBER SECURITY

Academic Units | 3
Contact Hours | Lectures (26); Tutorials (12)
Pre-requisite | -

Learning Objective

The objective of this course is to provide students with basic appreciation and understanding of the underlying security issues and implications of the use of various networked systems and electronic devices in the modern cyber-society from a user perspective. Topics to be covered include overview of information systems and devices in a global network environment, threats to information systems and devices, security models, and concepts for secrecy, integrity and availability. Other topics of security concerns will also be explored: evaluations of secure information systems, security requirements analysis, security management policies, security trends and emerging technologies.

Contents

Introduction to cyber-crimes and security issues in a cyber-environment. System perspectives of information security: Issues and solution approaches. Concepts for secrecy, integrity and availability. Security solutions and models. Security planning & management. Security cases and technology trends.

Student Assessment

- Continuous Assessment
- Written Examination

Textbook

1. Tsai Flora S and Chan Chee Keong, Cyber Security, Pearson Custom, 2006. (TK5105.59.C994)
2. Principles of Information Security, 5th Edition, Michael E. Whitman and Herbert J. Mattord, Cengage Learning 2014.

References

1. Volonino Linda, Robinson Stephen R and Volonino Charles P, Principles and Practice of Information Security: Protecting Computers from Hackers and Lawyers, 1st Edition, Pearson/Prentice-Hall, 2004. (TK5105.59.V929)
2. Stallings William, Network Security Essentials: Applications and Standards, 5th Int'l Edition, Pearson Prentice- Hall, 2013. (TK5105.59.S782N 2013)
3. Maiwald Eric, Fundamentals of Network Security, McGraw-Hill, 2004. (TK5105.59.M232F)
4. Ng Jessica, Tsai Flora S and Foo Say Wei, E-Business Management, Pearson Education, 2006. (HF5548.32.E11B)

EE8085 - ELECTRIFICATION FOR THE BUILT ENVIRONMENT

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

The objective of this course is to impart to students knowledge pertaining to the generation and distribution of electricity, and how electricity usage impacts on a modern society. Essential aspects of power system technology, electricity utilization and recent developments on electricity industry restructuring would be discussed. Energy conservation and safety issues will also be covered.

Contents

Conventional sources of electricity generation, transmission and distribution systems. Clean/green power and renewable sources. Liberalization of electricity industry and energy procurement. Electricity utilization and quality. Energy conservation. Safety.

Student Assessment

- Continuous Assessment
- Written Examination

Textbook

1. Darryl R. Biggar and Mohammad Reza Hesamzadeh, The Economics of Electricity Markets (Wiley - IEEE) 1st Edition, 2014

Reference

1. Sally Hunt, Making Competition Work in Electricity, John Wiley and Sons, New York 2002.

EE8086 - ASTRONOMY – STARS, GALAXIES AND COSMOLOGY

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

The basic goal of this course is to give students a fundamental understanding of astronomy. Through the course, the students will learn about the birth of the universe, the origin of galaxies, the evolution of stars and the formation of planets. Our solar system will be one of the main topics to be studied. Some unanswered mysteries of the universe and mankind will be discussed and hopefully lead the students to further their own exploration. During this course, the diverse facts that form the context of a science will be delivered. During the course, students will also have opportunities to participate in various practical sessions and trips may be organized where appropriate.

Contents

The origin of modern astronomy – An introduction. Learn to read the stars. Overview of the solar system. The beginning and life of stars. The mysteries ahead. The future of space exploration.

Student Assessment

- Continuous Assessment
- Written Examination

Textbook

1. Bennett Jeffrey O, The cosmic perspective: stars, galaxies & cosmology, 7th edition, Pearson Addison-Wesley, 2014 (QB43.3.C834 2014)

References

1. Seeds Michael A, Horizons: Exploring the Universe, 13th Edition, Thomson Brooks/Cole, 2014 (QB45.2.S451 2014)
2. Bennett Jeffrey O, On the Cosmic Horizon: Ten Great Mysteries for Third Millennium Astronomy, Addison-Wesley, 2001. (QB43.2.B471)

EE8087 - LIVING WITH MATHEMATICS

Academic Units | 3
Contact Hours | Lectures (26); Tutorials (12)
Pre-requisite | -

Learning Objective

Mathematics plays a fundamental role in everyday life. The purpose of this course is to explore the various topics of mathematics, e.g. algebraic equations, trigonometry, conic sections, functions, differentiation and integration, which have direct applications in real world problems. Students will learn (i) how to translate real life problems into appropriate mathematical context and (ii) skills and techniques for solving these problems.

Contents

Solving algebraic equations and applications. Trigonometry with applications. Conic sections: straight line, circle, hyperbola, parabola, ellipse. Planets of the universe. Functions in daily life. Applications of differentiation and integration. Personal finance.

Student Assessment

- Continuous Assessment
- Written Examination

References

1. Jordan D W and Smith Peter, Mathematical Techniques: An Introduction for the Engineering, Physical, and Mathematical Sciences, 4th Edition, Oxford University Press, 2008. (QA300.J82 2008)
2. Strauss Monty J, Smith Karl J and Bradley Gerald L, Calculus, 3rd Edition, Prentice Hall, 2002 (QA303.B811)
3. Hughes-Hallett Deborah, Calculus, 4th Edition, John Wiley, 2005. (QA303.C144C 2005)
4. Stewart James, Calculus, 7th Edition, Thomson Brooks/Cole, 2012. (QA303.2.S849 2012)

EE8092 - DIGITAL LIFESTYLE

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

iPod and MP3 players, 3G mobile phones, Multi-megapixel digital cameras, Spy cameras, 3CCD video camcorders, Intel Pentium Core-Duo Processors, Xbox/PlayStation, LCD/Plasma/HD TVs, and Dolby Digital Surround Sound play a big part in our lives today, but do you really know how these digital gadgets and technologies work? Do you know how to choose among the various brands and features that best suit your budget and requirements? Enroll into this course, and you won't be baffled by salespersons, advertisements and terminologies. The digital gadgets and lifestyle covered in this course include: Home Entertainment Systems, Game Consoles, Digital Audio Players and Systems, Digital Cameras and Video Camcorders, Personal Computers, Mobile Phones and PDA.

Contents

Home entertainment systems and game consoles. Digital audio systems. Digital cameras and video camcorders. Personal computers. Mobile phones and PDA.

Student Assessment

- Continuous Assessment
- Written Examination

Textbooks

1. Shelly Gary B and Vermaat Misty E., Discovering Computers – Complete: Your Interactive Guide to the Digital World, International Edition, 1st Edition, Cengage Learning, 2013. (ISBN-13: 9781285082356)
2. Gonzalez Barb, The Home Electronics Survival Guide. Volume 1 : The Simple guide to Understanding, Hooking up, and Buying TV's HDTVs, DVDs, DVRs, Home Theater, Remote Controls and More, Home Electronics Survival, 2005. (TK9965.G643)

References

1. Pohlmann Ken C, Principles of Digital Audio, 6th Edition, McGraw-Hill, 2011.(TK7881.4.P748 2011)
2. Underdahl Keith, Digital Video for Dummies, 4th Edition, John Wiley, 2006. (TR896.U55)
3. Mark Galer, Digital Photography: Essential Skills, Fourth Edition, Elsevier/Focal, 2008.
4. Mallick Martyn, Mobile and Wireless Design Essentials, Wiley; 2003. (TK5103.2.M254)

EE8093 - ENERGY DEVICES FOR SUSTAINABLE URBAN ENVIRONMENT

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

This course will introduce students to the basic operating principles and applications of photovoltaic devices used for solar energy conversion, thermoelectric devices for energy harvesting and electrochemical devices for renewable energy storage.

Contents

Sustainability concepts. Crystalline solar cells. Thin film solar cells. Thermoelectric devices. Supercapacitors. Batteries.

Student Assessment

- Continuous Assessment
- Written Examination

Textbooks

1. Wenham S R, Green M A, Watt M E and Corkish R, Applied Photovoltaics, 3rd Edition, Earthscan, 2012. (TK1087.A652 2012)
2. Hamann Carl H, Hamnett Andrew and Vielstich Wolf, Electrochemistry, 2nd Edition, Wiley-VCH, 2007. (QD553.H198 2007)

References

1. Luque Antonio and Hegedus Steven, Handbook of Photovoltaic Science and Engineering, 2nd Edition, Wiley, 2011. (TK8322.H236)
2. Conway B E, Electrochemical Supercapacitors : Scientific Fundamentals and Technological Applications, Kluwer Academic / Plenum Press, 1999. (TK2941.C767)

EE8095 – INNOVATION AND COMMERCIALIZATION

Academic Units | 3
Contact Hours | Lectures (39)
Pre-requisite | -

Learning Objective

This course covers the fundamental process of innovation through its implications on organizations and innovation ecosystems. It emphasizes historical and modern examples of innovation in materials and devices, and discusses the final implications for innovation ecosystems. This course also presents a simple model for students to understand the innovation process as a highly iterative process, in which many factors in the areas of Technology, Market and Implementation are cycled repeatedly through until the right pieces come together.

Contents

Introduction, Definition and the Three Basic Elements. Technology. Market Application. Implementation. The Generic Nature of Innovation. Reducing Uncertainty & Iteration. Incremental and Fundamental Innovation. Apple, Google, Facebook. Fundamental Innovation: X-Ray. Fundamental Innovation: Printing. Fundamental Innovation: Strained Silicon. Intellectual Property. Teams and Organization & The Modern Innovation System.

Student Assessment

- Continuous Assessment

Textbook

1. Eugene Fitzgerald, Andreas Wankerl, and Carl J. Schramm, "Inside Real Innovation: How the Right Approach Can Move Ideas from R&D to Market - And Get the Economy Moving," World Scientific, 2011.

Reference

1. The online reading material will be available through the course website.