UG-DCS UNDERGRADUATE PROGRAMMES

STRUCTURE OF LEVEL 100 PROGRAMME

PHYSICAL SCIENCES

FIRST SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
PHYS 105	Practical Physics I	1	
PHYS 143	Mechanics and Thermal Physics	3	
CHEM 113	Foundation Chemistry I	3	
CHEM 120	General Chemistry Laboratory I	1	
MATH 121	Algebra and Trigonometry	3	
Total		14	
Electives: Select 3 credits			
DCIT 101	Introduction to Computer Sciencen I	3	
EASC 101	Physical Geology	3	
MATH 123	Vectors and Geometry	3	
ABCS 101	Introductory Animal Biology	3	

Students who wish to be considered for Geophysics at Level 200 should take EASC 101

SECOND SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
PHYS 106	Practical Physics II	1	
PHYS 144	Electricity and Magnetism	3	
CHEM 114	Foundation Chemistry II	3	
*CHEM 122	General Chemistry Laboratory II	1	
MATH 122	Calculus I	3	
Total		14	
Electives: Select 3 credits			
DCIT 104	Programming Fundamentals	3	
EASC 104	Historical Geology	2	
EASC 106	Geological Field Excursions	1	

MATH 126	Algebra and Geometry	3	
BOTN 104	Growth of Flowering Plants	3	

Students who wish to be considered for Geophysics at Level 200 should take EASC 104 and EASC 106.

MATHEMATICAL SCIENCES

FIRST SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
MATH 121	Algebra and Trigonometry	3	
MATH 123	Vectors and Geometry	3	
STAT 111	Introduction to Statistics and Probability I	3	
DCIT 101	Introduction to Computer Science	3	
Total		15	
Electives: Select 3 to 4 credits			
PHYS 105	Practical Physics I	1	
PHYS 143	Mechanics and Thermal Physics	3	
ABCS 101	Introductory Animal Biology	3	
ECON 101	Introduction to Economics I	3	
DCIT 103	Office Productivity Tools	3	

Students who wish to be considered for a programme in Actuarial Science and Biomathematics at Level 200 should take ECON 101 and ABC 101, respectively.

SECOND SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
MATH 122	Calculus I	3	
MATH 126	Algebra and Geometry	3	
STAT 112	Introduction to Statistics and Probability II	3	
DCIT 104	Programming Fundamentals	3	
Total		15	
Electives: Select 3 to 4 credits			

DCIT 102	Computer Hardware Fundamentals and Circuits	3	
PHYS 106	Practical Physics II	1	
PHYS 144	Electricity and Magnetism	3	
ECON 102	Introduction to Economics II	3	
BOTN 104	Growth of Flowering Plants	3	

Students who wish to be considered for a programme in Actuarial Science and Biomathematics at Level 200 should take ECON 102 and BOTN 104, respectively. Students who wish to be considered for a programme in Computer Science should select DCIT 102.

EARTH SCIENCES
FIRST SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
PHYS 105	Practical Physics I	1	
PHYS 143	Mechanics and Thermal Physics	3	
CHEM 113	Foundation Chemistry I	3	
CHEM 120	General Chemistry Laboratory I	1	
EASC 101	Physical Geology	3	
Total		14	
Electives: Select 3 credits			
MATH 121	Algebra and Trigonometry	3	
MATH 123	Vectors and Geometry	3	
STAT 111	Introduction to Statistics and Probability I	3	
DCIT 101	Introduction to Computer Science	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
PHYS 106	Practical Physics II	1	
PHYS 144	Electricity and Magnetism	3	
CHEM 114	Foundation Chemistry II	3	
EASC 104	Historical Geology	2	

EASC 106	Geological Field Excursions	1	
Total		13	
Electives: Select 3 credits			
MATH 122	Calculus I	3	
MATH 126	Algebra and Geometry	3	
STAT 112	Introduction to Statistics and Probability II	3	
DCIT 104	Programming Fundamentals	3	

INFORMATION TECHNOLOGY

FIRST SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
DCIT 103	Office Productivity Tools	3	
DCIT 101	Introduction to Computer Science	3	
DCIT 105	Mathematics for IT Professionals	3	
STAT 111	Introduction to Statistics and Probability I	3	
Total		15	
Electives: Select 3 to 6 credits			
MATH 123	Vectors and Geometry	3	
ECON 101	Introduction to Economics I	3	Only Single Major IT Students
MATH 121	Algebra and Trigonometry	3	

Students who wish to be considered for Computer Science at Level 200 should take MATH 123 and MATH 121.

SECOND SEMESTER

Code	Title	Credits	Pre-requisites
Core			
UGRC		3	
DCIT 102	Computer Hardware Fundamentals and Circuits	3	
DCIT 104	Programming Fundamentals	3	
MATH 122	Calculus I	3	

Total		12	
Electives: Select 6 to 9 credits			
MATH 126	Algebra and Geometry	3	
UGBS 104	Principles of Management	3	
ECON 102	Introduction to Economics II	3	Only Single Major IT
STAT 112	Introduction to Statistics and Probability II	3	

Students who wish to be considered for Computer Science at Level 200 should take MATH 126.

COURSE DESCRIPTIONS

CHEM 113: Foundation Chemistry I

This course is designed to provide students with the fundamental concepts in general chemistry. Topics to be considered will include: measurements and presentation of data, uncertainty in measurements, significant figures; Normal distribution of data, Precision, Accuracy and Propagation of errors in calculations. Acid- base concepts such as BronstedLowry's concept ($\geq 10^{-6}$M); strength of acids and bases; levelling effect of water; pX scale; Hydrolysis of salts (cations and anions) are dealt with. The course concludes with and introduction to redox reactions and its applications; Solubility of sparingly soluble salts and their important terms including ionic product constants; Ksp; common-ion effect and selective precipitation.

Reading List

Atkins, J. W., (1989). General Chemistry. Scientific American Books, New York.

Bodner, G. M., & Pardue, H. L., (1995). Chemistry: An Experimental Science. John Wiley and Sons, Inc., New York.

Hill, J. W., & Petrucci, R. H., (2002). General Chemistry: An integrated Approach. Prentice-Hall Inc., New Jersey.

Kotz, J., & Treichel P., (1999). Chemistry and Chemical Reactivity. Saunders College Publishing, New York.

Olmsted, J., & Williams, G., (2002). Chemistry. John Wiley and Sons Inc., New York.

Skoog, D., West, D., & Holler, F. J., (1994). Fundamentals of Analytical Chemistry. Saunders College Publishing, New York.

Zumdahl, S. S., & Zumdahl, A. S., (2014). Chemistry (9th Edition). Houghton Mifflin Company, Boston, New York.

CHEM 114: Foundation Chemistry II

This course provides a foundation for knowledge in organic chemistry to students. Concepts to be discussed will include structural determination of organic molecules involving the use of major purification techniques, qualitative and quantitative analysis and the use of spectroscopic techniques in structure elucidation. Students will be introduced to the concept of functional groups with a focus on alkanes and cycloalkanes, alkenes and alkynes including for sources, formation, uses and reactions where necessary. Stereochemistry of these hydrocarbons as well as other fundamental organic concepts will be introduced to give a good foundation for subsequent courses in organic chemistry at higher levels.

Reading List

Hill, J. W., & Petrucci, R. H., (2002). General Chemistry: An integrated Approach. Prentice-Hall Inc., New Jersey.

Jones, M. Jr., (1997). Organic Chemistry (1st Edition). W.W. Norton & Com. Inc.

McMurry, J., (2011). Fundamentals of Organic Chemistry (International edition, 7th Edition). Brooks & Cole, Cengage Learning.

Patrick, G. L., (2004). Organic Chemistry, Instant Notes (2nd Edition). Bios Scientific Pub.

Zanger, M., & Mckee, J., (1997). Essentials of Organic Chemistry (1st Edition). Wm. C. Brown Pub.

Zumdahl, S. S., & Zumdahl, S. A., (2014). Chemistry (9th Edition). Houghton Mifflin Company, Boston, New York.

Hart, D. J., Hadad, M. C., Craine, E. L., & Hart, H., (2012). Organic Chemistry, A Brief Course (International edition, 13th Edition). Brooks & Cole, Cengage Learning.

CHEM 120: General Chemistry Laboratory I

This practical course exposes the students to basic techniques in volumetric analysis including: preparation of standard solutions, acid/base titrations; redox titrations involving permanganate, and iodimetry. Applications of volumetric analysis such determination of solubility product constants, purity of reagents, determination of water of hydration will be explored. Throughout the course, attention is drawn to uncertainties in measurements, the use of significant figures, propagation of errors, precision, and accuracy in order to ensure the application of the knowledge gained in the theory.

Reading List

Fifield, F. W., & Kealey, D., (1986). Principles and practices of analytical chemistry (2nd edition).

Harris, D. C., (2007). Quantitative Chemical Analysis (7th Edition). New York, NY: W.H. Freeman and Co.

John, D., Alan, M. J., David, H., Rob, R., & Jonathan, W., (2010). Practical Skills in Chemistry.

Jürg, P. S., (2005). Good Lab Practice (2nd edition).

Mendham, J., Denney, R. C, Barnes, J. D., & Thomas, M. J. K., (2000). Vogel's Quantitative Chemical Analysis (6th Edition). Prentice Hall.

Vogel, A. I., & Jeffery, G. H., (1989). Textbook of Quantitative Chemical Analysis.

CHEM 122: General Chemistry Laboratory II

This laboratory-based course seeks to equip students with further skills in experimental techniques. Qualitative inorganic analysis such as; determination of aluminium, barium, bismuth, calcium, copper, iron, nickel and silver, as well as the identification of halides, phosphates, sulphates and nitrates; simple organic synthetic preparations such as the synthesis of the analgesic aspirin from salicylic acid and acetic anhydride with exercises in purification and re-crystallization are some of the practical concepts and applications that will be explored.

Reading List

Fabirkiewicz, A. M., & Stowell, J. C, (2015). Intermediate Organic Chemistry (3rd Edition). Wiley.

Leonard, J., Lygo, B., & Procter, G., (2013). Advanced Practical Organic Chemistry (3rd Edition). CRC press.

Mendlam, J., Denny, R. C., Barnes, J. D., & Thomas, M. J. K., (2000). Vogel's Quantitative Chemical Analysis (6th Edition). Prentice Hall.

Suehla, G., (1996). Vogel's Qualitative Inorganic Analysis (7th Edition). Prentice Hall.

Vogel, A. I., Tatchell, A. R., Furnis, B. S., Hannaford, A. J., & Smith, P. W. G., (1996). Vogel Textbook of organic Chemistry (5th Edition). Pearson.

PHYS 105: Practical Physics I

In this first of a series of practical physics courses, laboratory experiments are conducted to expose students to handling various measuring instruments and to data and error analysis. The course begins with an introduction to physical measurement techniques, data presentation, and error analysis. This is followed by several experiments in mechanics and thermal physics. Additional experiments in other topical areas may be included.

Reading List

Baird, D. C. (1995). Experimentation: An introduction to measurement theory and experiment design (3rd Edition). Englewood Cliffs, NJ: Prentice-Hall.

Bennington, P. R., & Robinson, D. K. (2003). Data reduction and error analysis for the physical sciences. New York, NY: McGraw-Hill.

Morris, A.S. (2001). Measurement and instrumentation principles. Oxford. Butterworth-Heinemann.

Squires, G. L. (2001). Practical physics (4th Edition.). Cambridge, UK: Cambridge University Press.

Taylor, J. R. (1982). An introduction to error analysis. Mill Valley, CA: University Science Books.

PHYS 106: Practical Physics II

This is the second in a sequence of laboratory courses. PHYS 106 builds on the techniques developed in PHYS 105 and further laboratory experiments are conducted to reinforce data collection and data analysis techniques developed in PHYS 105. Experiments in electricity and magnetism, in optics, electronics, vibrations, oscillations, and waves may be included.

Reading List

Baird, D. C. (1995). Experimentation: An introduction to measurement theory and experiment design (3rd Edition). Englewood Cliffs, NJ: Prentice-Hall.

Bennington, P. R., & Robinson, D. K. (2003). Data reduction and error analysis for the physical sciences. New York, NY: McGraw-Hill.

Morris, A.S. (2001). Measurement and instrumentation principles. Oxford. Butterworth-Heinemann.

Squires, G. L. (2001). Practical physics (4th Edition.). Cambridge, UK: Cambridge University Press.

Taylor, J. R. (1982). An introduction to error analysis. Mill Valley, CA: University Science Books.

PHYS 143: Mechanics and Thermal Physics

This course is a calculus-based general physics course that introduces students to basic principles in mechanics and thermal physics. Topics covered in the course include the following: vectors and vector algebra; linear momentum; motion; Newton's laws; force; circular motion; work and energy; rotational motion; gravitation; thermodynamic systems; thermal equilibrium; work and heat; First law of thermodynamics; entropy; gas laws; Kinetic theory of gases.

Reading List

Giancoli, D. C. (2016). Physics: Principles with applications (7th Edition). Essex, England: Pearson Education Limited.

Halliday, D., Resnick, R., & Walker, J. (2014). Fundamentals of physics (10th Edition). Hoboken, NJ: John Wiley & Sons, Inc.

Knight, R. D. (2018). Physics for scientists and engineers: A strategic approach with modern physics (4th Edition). Essex, England: Pearson Education Limited.

Tipler, P., & Mosca, G. (2014). Physics for sscientists and engineers. New York, NY: W. H. Freeman.

Young, H. D., & Freedman, R. A. (2015). University physics (with modern physics) (14th Edition). Essex, England: Pearson Education Limited.

PHYS 144: Electricity and Magnetism

This course is a calculus-based general physics course that introduces students to basic principles in electricity and magnetism. Topics covered in the course include the following:

Reading List

Electric charge and electric field; Gauss' law; electrical potential; capacitance and dielectrics; electric current, resistance and direct-current circuits; magnetic field and magnetic forces; sources of magnetic fields; magnetic materials; electromagnetic induction; displacement current and Maxwell's equations; inductance; alternating current.

Giancoli, D. C. (2016). Physics: Principles with applications (7th Edition). Essex, England: Pearson Education Limited.

Halliday, D., Resnick, R., & Walker, J. (2014). Fundamentals of physics (extended edition, 10th Edition). Hoboken, NJ: John Wiley & Sons, Inc.

Knight, R. D. (2018). Physics for scientists and engineers: A strategic approach with modern physics (4th Edition). Essex, England: Pearson Education Limited.

Tipler, P. & Mosca, G. (2014). Physics for sscientists and engineers. New York, NY: W. H. Freeman.

Young, H. D. & Freedman, R. A. (2015). University physics (with modern physics) (14th Edition). Essex, England: Pearson Education Limited.

EASC 101: Physical Geology

This course introduces students to the science of the earth and the processes, both internal and external, that act upon it. The course covers the following topics: minerals; volcanism and extrusive rocks; intrusive activities and origin of igneous rocks; weathering and soil; sediments and sedimentary rocks; metamorphism, metamorphic rocks and hydrothermal rocks; the rock cycle; mass wasting; streams and landscape; groundwater; glaciers and glaciation; deserts and wind action; shorelines and coastal processes; crustal deformation and folds; faults; earthquakes; plate tectonics; mountain building.

Reading List

Busch R.M., & Tasa, D.G. (2014). Laboratory Manual in Physical Geology (10th Edition0. Pearson.

Jordan, T.H., & Grotzinger, J. (2014). Understanding Earth (7th Edition). W.H. Freeman.

Monroe, J.S., Wicamber, R., & Hazlet, R. (2006). Physical Geology: Exploring the Earth, 6th Edition. Brooks Cole.

Plummer, C.C., Carlson, D., & Hammersley, L. (2015). Physical Geology (15th Edition). McGraw-Hill Education.

Tasa, D.G., Lutgens, F.K., & Tarbuck, E.J. (2016). Earth: An introduction to Physical Geology (12th Edition). Pearson.

Reading List

EASC 106: Geological Field Excursions
This course allows students to visit appropriate facilities or selected areas of interest and is designed to reinforce geological concepts learnt in class. This presents a useful and interesting way to learn about the environment and geological processes. Study trips may include visits to large and small industrial firms throughout the entire country, or tunnel projects that are underway, as well as natural areas that require special measures with regards to the environment.

Busch, R. M., & Tasa, D.G. (2014). Laboratory Manual in Physical Geology (10th Edition). Pearson.

Jordan, T.H., & Grotzinger, J. (2014). Understanding Earth (7th Edition). W.H. Freeman.

Monroe, J.S., Wicamber, R., & Hazlet, R. (2006). Physical Geology: Exploring the Earth (6th Edition). Brooks Cole.

Plummer, C.C., Carlson, D., & Hammersley, L. (2015). Physical Geology (15th Edition). McGraw-Hill Education.

Tasa, D.G., Lutgens, F.K., & Tarbuck, E.J. (2016). Earth: An introduction to Physical Geology (12th Edition). Pearson.

EASC 104: Historical Geology
The course provides students with an understanding of the principles of historical geology and how these principles are applied in unravelling Earth's history. It begins with discussions on concepts and principles, followed by a chronological discussion of Earth and life history. It then discusses the lessons learned from the geologic past to understand and place in context some of the global issues facing the world today, such as depletion of natural resources, global climate warming, and decreasing biodiversity.

Reading List
Gore, P.W. (2014). Historical Geology Lab Manual (1st Edition). Wiley.

Monroe, J.S., & Wicander, R. (2015). Historical Geology (8th Edition). Brooks Cole.

Poort, J.M., & Carlson, R.J. (2004). Historical Geology: Interpretations and Applications (6th Edition). Pearson.

Ritter, S., & Petersen, M. (2006). Interpreting Earth History: A Manual of Historical Geology (8th Edition). Waveland Press, Inc.

Reading List

Stanley, S.M., & Luczaj, J.A. (2014). Earth System History (4th Edition). W.H. Freeman.

DCIT 101 Introduction to Computer Science

This course provides a broad survey introducing the key areas the computer science discipline and information technology discipline. It introduces computers and how they work, their classification and historical development. Topics covered will include Application of computers; Data representation in Computers; Peripherals; Files; Systems Engineering; Databases; Computer architecture; Assembly language; Data Communications and networking; Systems software; Programming concepts in very accessible language Python; Algorithms and data structures; The internet and Web Technology. Programming assignments are inspired by real-world domains of cryptography, forensics, gaming and finance.

Heathcote, P., & Bond, K. (2013). A Level Computing. London: BPP (Letts Educational).

Brookshear, J. G. (2011). Computer Science: An Overview (11th Edition). Boston: Addison Wesley.

Geoffrey, S. (2008). Introduction to Computer Information System (2nd Edition.). Iowa: Kendall Hunt Publishing.

Kamaljeet, S. (2013). Fundamentals of Computing (2nd Edition). Iowa: Kendall Hunt Publishing.

Miller, M. (2011). Absolute Beginner's Guide to Computer Basics (4th Edition). New York: Que Publishing.

DCIT 102 Computer Hardware and Circuits

It provides comprehensive understanding of the essential components associated with computers with a focus on PCs. Topics include: The microprocessor, motherboard, memory, graphics and sound adapters, I/O devices storage and circuit theory. An overview of operating systems and other software, as well as the various methods used to connect computers to each other and the Internet, are presented. The course also addresses recent advances in computer architectures and computer hardware and how they affect computer performance. Presentations of actual hardware are included so that students can gain experience in identifying the various internal and external components of a PC.

Reading List:

Dandamudi, S. P. (2013). Fundamentals of Computer Organization and Design (3rd Edition). New York: Springer.

Reading List

Norton, P., & Clark, S. H. (2012). Inside the PC (2nd Edition). Indianapolis, IN: Sams Publishing.

Parker, C. S., & Morley, D. (2014). Understanding Computers: Today and Tomorrow, Introductory (13th Edition). Cambridge, MA: Course Technology.

Patterson, D. A., & Hennessy, J. L. (2012). Computer Organization and Design: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design). Amsterdam: Morgan Kaufmann.

White, R., & Downs, T. E. (2013). How Computers Work (9th Edition). Indianapolis, IN: Que Pub.

DCIT103 Office Productivity Tools

This course teaches use of office productivity tools. Microsoft Office 2016 software products Word, Excel, Outlook, and PowerPoint will be taught in depth. Topics include: Word– creating documents text editing, formatting, saving, and printing, creating table of contents; commenting tools, proofing, tracking; Excel- creating spreadsheets, data entry, formatting, formulas, functions, tables and performing calculations on data, charts and graphics, dynamic

worksheets using pivot tables, macros; Outlook- setting up Outlook server, managing email messages, contacts, appointments and tasks, and efficiency and customization; PowerPoint- creating slide presentations using design templates, formatting, graphics, animations, presentation, add sounds and graphics, visual elements, and tables.

Reading List

Curtis, F. (2015). Microsoft Excel 2016 Step by Step (1st Edition).

Joan, L. (2016). Microsoft Outlook 2016 Step by Step, (1st Edition). Microsoft Press.

Margo, C. A., Lisa, H., Catherine, H., & Stephanie M-W. (2016). Skills for Success with Microsoft Office 2016 Volume 1 (Skills for Success for Office 2016 Series) (1st Edition).

Steven, M. F., Joy, L. S., & Eric, S.(2016). Cashman Series Microsoft Office 365 & Excel 2016: Comprehensive, (1st Edition). CENGAGE Learning.

Randy, N. (2016). Microsoft Office 2016: In Practice, (1st Edition).

DCIT 104 Programming Fundamentals

Problem Solving and Programming are essential skills for IT students and IT professionals. Learning how to solve a problem using a structured programming language provides a strong foundation for a successful career. Designing of solutions to problems using procedural techniques and deciding on an appropriate repetition and/or selection structures for given problems will be covered. Topics Include: The importance of algorithms in the problemsolving process; Properties of good algorithms, Algorithms for solving simple problems; the use of a programming language to implement, test, and debug algorithms for solving simple problems, data definition, control structures, functions, arrays, pointers and strings.

Reading List:

Dean, J., & Dean, R. (2012). Introduction to Programming with Java: A Problem Solving Approach (4th Edition). Dubuque, IA: McGraw-Hill.

Felleisen, M., Findler, R. B., Flatt, M., & Krishnamurthi, S. (2011). How to Design Programs: An Introduction to Programming and Computing, Cambridge, MA: MIT Press.

Liang, D. Y. (2014). Intro to Java Programming, Comprehensive Version (10th Edition). Pearson.

Robertson, L. A. (2010). Simple Program Design, A Step-by-Step Approach, (5th Edition). Cambridge, MA: Course Technology.

Savitch, W. (2013). Java: An Introduction to Problem Solving and Programming (6th Edition). Harlow: Addison Wesley.

CSIT 104: Mathematics for IT Professionals

This course will cover some particularly important concepts used in computer science. Graph theory concepts are used in networks, operating systems, and compilers. Set theory concepts are used in software engineering and in databases. Topics to be covered include Sets Venn diagrams, Cartesian product, Power sets, Cardinality of finite sets; Relations, Reflexivity, symmetry, partial orders; Functions, Surjections, injections, bijections, Inverses, Composition; Trees, Properties, Traversal strategies, Undirected graphs, Directed graphs, Weighted graphs, Spanning trees/forests, Graph isomorphism; Counting arguments, Set cardinality and counting, Sum and product rule, Inclusion-exclusion principle, Arithmetic and geometric progressions, The pigeonhole principle, Permutations and combinations, Pascal's identity.

Reading Lists:

Barnett, R. A. (1999). Applied Calculus with Linear Programming for Business, Economics, Life Sciences and Social Sciences (5th Edition). Boston, MA: Prentice Hall.

Busbee, K. L. (2009). Programming Fundamentals: A Modular Structured Approach Using C++. Orange Grove Texts Plus.

Larson, R., Edwards, B. H., & Falvo, D. C. (1999). Brief Calculus: An Applied Approach, (5th Edition). Boston, MA: Houghton Mifflin College Div.

Lex, H., & Toon, K. (2007). Applied Mathematics for Database Professionals. New York, Apress.

Steele, J. M. (2010). Stochastic Calculus and Financial Application (Stochastic Modelling and Applied Probability). Berlin: Springer.

MATH 121: Algebra and Trigonometry

This course is a precalculus course which aims to develop the students' ability to think logically, use sound mathematical reasoning and understand the geometry in algebra. It includes advanced levels of topics addressed in high school such as arrangements, selections and the binomial theorem. Sequences and series. Logic and Proof. Set theory. Indices, logarithms and the algebra of surds. Concept of a function. Trigonometric functions, their inverses, their graphs, circular measure and trigonometric identities.

Reading List:

Backhouse, J.K., Houldsworth, S.P.T., & Cooper B.E.D. (2010). Pure Mathematics 2, Longman.

Bittinger, M. L. et al (2012) Algebra and Trigonometry (5th edition). Pearson

Bostock, L., Chandler, S., & Thorpes, S. (2014). Mathematics; the core course for A-level. Oxford University Press.

Bostock, L., Chandler. S., & Thorpes, S. (2014) Further Pure Mathematics, Oxford University Press.

Spiegel, M.R., & Moyer, R.E. (2014). Schaum's Outline of College Algebra (4th Edition). McGraw-Hill Education

MATH 123 Vectors and Geometry

Vectors may be used very neatly to prove several theorems of geometry. This course is about applying vector operations and the method of mathematical proof (of MATH 121) to geometric problems. The areas of study include: vector operations with geometric examples; components of a vector and the scalar product of vectors. Coordinate geometry in the plane including normal vector to a line, angle between intersecting lines, reflection in a line, angle bisectors and the equation of a circle, the tangent and the normal at a point.

Reading List:

Akyeampong, D.A., (2006). Vectors and Geometry. Departmental Lecture notes.

Backhouse, J.K., Houldsworth, S.P.T., & Horril, P.J.F. (2010). Pure Mathematics. Longman

Bostock, L., Chandler. S., & Thorpes, S. (2014). Further Pure Mathematics. Oxford University Press.

Robinson, G. B. (2011). Vector geometry. Dover.

Schuster, S. (2008). Elementary Vector Geometry. Dover.

MATH 122: Calculus I

Elementary idea of limit, continuity and derivative of a function. Rules of differentiation. Applications of differentiation. Derivative of the elementary and transcendental functions. Methods of integration. Improper integrals. Applications of integration. Formation of differential equations and solution of first order differential equations both separable variable type and using an integrating factor.

Reading List:

Hughes-Hallett, D., Gleason A.M., et al (1994). Calculus. A. J. Wiley.

Kline, M. (1998). Calculus: An Intuitive and Physical Approach (2nd Edition). Dover.

Lang, S. (1998). A First Course in Calculus (Undergraduate texts). Springer.

Stewart, J. (1995). Calculus, concepts and context. Brooks/Cole

Thomas, G.B., & Finney, R.L. (1995). Calculus and Analytic Geometry. Addison Wesley Publishing Company

MATH 126 Algebra and Geometry

This is a course which highlights the interplay of algebra and geometry. It includes topics such as: polar coordinates; conic sections. Complex numbers, Argand diagram, DeMoivre's theorem, roots of unity. Algebra of matrices and determinants, linear transformations. Transformations of the complex plane. Sketching polar curves and some coordinate geometry in 3 dimensions. Vector product and triple products.

Reading List:

Beacher, J., Penna, J. A., & Bittinger, M. L. (2005). College Algebra (2nd Edition). Addison Wesley

Copeland, A. H. (1962). Geometry, algebra and trigonometry by vector methods. Mac-Millan

Safler, F. (2012). Schaum's Outline of Precalculus (3rd Edition). McGraw-Hill Education

Spiegel, M.R., & Moyer, R.E. (2014). Schaum's Outline of College Algebra (4th Edition). McGraw-Hill Education

Sullivan, M. (2005). College Algebra. Prentice Hall.

MATH 101 General Mathematics I (Non-Mathematics students)

The aim of this course is to equip students with sufficient elementary algebra and calculus to allow them to solve elementary problems in the biological and physical world. Topics from high school are revised and in some cases extended. The main focus is to provide sufficient precalculus and trigonometry to allow students to apply calculus to problem solving.

Reading List:

Aufman, R.N., Barker, V.C., & Nation, R. D. (2008). College Algebra. Houghton, Mifflin Boston

Backhouse, J.K., & Houldsworth, S.P.T (2010). Pure Mathematics 1. Longman.

Greenwell, R. N., Ritchey, N.P., & Lial, M. L. (2002). Calculus with applications to the life sciences. Pearson

Lial, M. L., & Miller, C.D. (1975). Essential calculus with applications in Business, Biology and the Behavioural Sciences. Pearson Scott Foresman

Mannal, G., & Kenwood, M. (1994). Pure mathematics 2. Heinemann Publishers Oxford

STAT 111: Introduction to Statistics and Probability I

This course introduces students to basic principles in Statistics and Probability. The definition, reduction and interpretation of data. Introduction to basic concepts of Probability; Random Events and Random Variables, and Bayes Theorem. Students will be given overview of computational statistics and an introduction to the computing environment. The

statistical software (R, Minitab and Stata) will be used to execute concepts learned in class. Methods of data description and analysis using R, Minitab and Stata: emphasis on learning statistical methods and concepts through hands-on experience with real data. One-hour Lab session a week will be organized for students.

Reading List

Anderson, A. J. (1989). Interpreting data: a first course in statistics (Vol. 8). CRC

Clarke, G. M., & Cooke, D. (1979). Basic course in statistics [A]. Press.

Rizzo, M.L. (2007). Statistical Computing with R.

Schinazi, R. B. (2011). Probability with statistical applications. Springer Science & Business Media.

Sheldon, R. (2002). A first course in probability. Pearson Education India.

STAT 112: Introduction to Statistics and Probability II

This course is aimed at enhancing students understanding of basic principles in Statistics and Probability. Relative frequency function, Introduction to probability distributions, some univariate probability distributions; Bernoulli, Binomial, Poisson, Uniform distributions. Simulation of random variables from probability distributions; Bernoulli, Binomial, Uniform distributions using R, Minitab and Stata: mean, variance, mode of probability distribution. Writing simple codes to generate discrete random values of the Bernoulli, Binomial and Poisson distributed random variables. One-hour Lab session a week will be organized for students.

Reading List

Chung, K.L. (2012). Elementary probability theory with stochastic processes. Springer Science & Business Media.

Feller, W. (1968). An Introduction to probability theory and its applications. Vol. I. London-New York-Sydney-Toronto: John Wiley & Sons.

Rizzo, M.L. (2007). Statistical computing with R.

Schinazi, R.B. (2011). Probability with statistical applications. Springer Science & Business Media.

Sheldon, R. (2002). A first course in probability. Pearson Education India.

LEVEL 200 - 400
TYPE OF DEGREE PROGRAMMES

The SPMS will continue to run three types of programmes:

1. Single-Subject Major
2. Major – Minor
3. Combined –Major

Single-Major Programmes

1. Actuarial Science
2. Applied Geophysics
3. Applied Geology
4. Biomathematics
5. Chemistry
6. Computer Science
7. Geology
8. Geophysics
9. Information Technology
10. Mathematics
11. Physics
12. Statistics

Combined-Major Programmes

1. Chemistry and a Biological Science programme
2. Chemistry and Physics
3. Computer Science and Mathematics
4. Computer Science and Statistics
5. Computer Science and Physics
6. Mathematics and Statistics
7. Physics and Mathematics
8. Physics and Statistics

Major-Minor

1. Computer Science with Mathematics
2. Computer Science with Physics
3. Computer Science with Statistics
4. Geology with Physics
5. Geology with Mathematics
6. Mathematics with Computer Science
7. Mathematics with Physics
8. Mathematics with Statistics
9. Mathematics with Geology
10. Physics with Computer Science
11. Physics with Geology
12. Physics with Mathematics

13. Statistics with Computer Science
14. Statistics with Mathematics
15. Physics with Statistics

REVISED UNDERGRADUATE PROGRAMS IN THE DEPARTMENT OF COMPUTER SCIENCE

BSc Computer Science and BSc Information Technology

The Department of Computer Science runs two types of programmes: BSc Computer Science which may be taken as a single major or combined with some other subjects and the BSc Information Technology. The programmes have been designed to ensure maximum flexibility allowing students to switch from one programme to the other.

SINGLE MAJOR IN COMPUTER SCIENCE

LEVEL 200

FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
UGRC 210	Academic Writing II	3	
DCIT 201	Programming I	3	
DCIT 203	Digital and Logic Systems Design	3	
DCIT 205	Multi Media and Web Design	3	
DCIT 207	Computer Organization and Architecture	3	
MATH 223	Calculus II	3	
Total		18	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
UGRC 220	Introduction to African Studies	3	
DCIT202	Mobile Application Development	3	
DCIT204	Data Structures & Algorithm I	3	
DCIT206	Systems Administration	3	
DCIT208	Software Engineering	3	
Total		15	
Electives: Select 3-6 credits			
DCIT 200	Internship	1	
DCIT 212	Numerical and Computational Methods	3	
DCIT 214	Information Modeling and Specification	3	

Students who wish to be considered for Computer Science programme should select DCIT 212

LEVEL 300

FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 301	Operating Systems	3	
DCIT 303	Computer Networks	3	
DCIT 305	Database Fundamentals	3	
DCIT 313	Introduction to Artificial Intelligence	3	
MATH 359	Discrete Mathematics	3	
Total		16	
Electives: Students may select 3 credits			
DCIT 307	Mini-Project	1	
DCIT 309	Embedded Systems and IoT	3	
DCIT 311	Machine Learning	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 302	Human Computer Interaction	3	
DCIT 304	Research Methods	3	
DCIT 308	Data Structures and Algorithms II	3	
DCIT 312	Information Security Management	3	
DCIT 318	Programming II	3	
Total		15	
Electives: Select 3-6 credits			
DCIT 306	Cloud Computing	3	
DCIT 316	Computational models for Social Media Mining	3	

LEVEL 400

FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 400	Project	3	

DCIT 401	Social, Legal, Ethical and Professional Issues	3	
DCIT 407	Image Processing	3	
Total		9	
Electives: Select 6-9 credits			
DCIT 403	Designing Intelligent Agents	3	
DCIT 405	Statistical Models and Methods for Data Science	3	
DCIT 411	Bioinformatics	3	
DCIT 417	Network Performance Analysis and Modeling	3	
DCIT 423	Network Servers and Infrastructure	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 400	Project	3	
DCIT 402	Management Principles in Computing	3	
DCIT 418	Systems and Network Security	3	
DCIT 428	Wireless Systems and Networks	3	
Total		12	
Electives: Select 3-9 credits			
DCIT 404	Advanced Databases	3	
DCIT 406	Advanced Computer Networks	3	
DCIT 408	Compilers	3	
DCIT 426	Telecommunication Systems	3	
DCIT 412	Computer Vision	3	
DCIT 414	Data Mining and Warehousing	3	
DCIT 416	Digital Signal Processing	3	
DCIT 422	Information Visualization	3	

COMBINED PROGRAMME IN COMPUTER SCIENCE

Students can major or minor in Computer Science. The Level 400 courses are for students who opt for a major in Computer Science only. Student minoring in Computer Science shall take at least 9 credits of any of the under listed courses per semester at level 200 and 6 credits per semester at level 300. Students who intend to major in Computer Science shall take 9 credits per semester at level 200 and 12 credits per semester at level 300.

LEVEL 200
FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
UGRC 210	Academic Writing II	3	
DCIT 201	Programming I	3	
DCIT 203	Digital and Logic Systems Design	3	
MATH 223	Calculus II	3	
Total		12	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
UGRC 220	Introduction to African Studies	3	
DCIT202	Mobile Application Development	3	
DCIT204	Data Structures & Algorithm I	3	
DCIT208	Software Engineering	3	
Total		9	
	Select 9 credits from above		

LEVEL 300
FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 301	Operating Systems	3	
DCIT 303	Computer Networks	3	
DCIT 305	Database Fundamentals	3	
Minor students shall select 6 credits from above Major students shall select all 9 credits. In addition, they shall select 3 credits from the electives below		6-9	

Electives: Major students shall select minimum 3 credits from below			
DCIT 309	Embedded Systems and IoT	3	
DCIT 313	Introduction to Artificial Intelligence	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 302	Human Computer Interaction	3	
DCIT 308	Data Structures and Algorithms II	3	
Total	Major and minor students shall select all 6 credits above	6	
Electives: Major students shall select all 6 credits			
DCIT 304	Research Methods	3	
DCIT 318	Programming II	3	

LEVEL 400

FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 400	Project	3	
DCIT 401	Social, Legal, Ethical and Professional Issues	3	
DCIT 407	Image Processing	3	
Total		9	
Electives			
DCIT 403	Designing Intelligent Agents	3	
DCIT 405	Statistical Models and Methods for Data Science	3	
DCIT 411	Bioinformatics	3	
DCIT 417	Network Performance Analysis and Modeling	3	
DCIT 423	Network Servers and Infrastructure	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite

Core			
DCIT 400	Project	3	
DCIT 402	Management Principles in Computing	3	
DCIT 418	Systems and Network Security	3	
DCIT 428	Wireless Systems and Networks	3	
Total		12	
Electives: Select minimum of 3 credits			
DCIT 404	Advanced Databases	3	
DCIT 406	Advanced Computer Networks	3	
DCIT 408	Compilers	3	
DCIT 426	Telecommunication Systems	3	
DCIT 412	Computer Vision	3	
DCIT 414	Data Mining and Warehousing	3	
DCIT 416	Digital Signal Processing	3	
DCIT 422	Information Visualization	3	

INFORMATION TECHNOLOGY

LEVEL 200

FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
UGRC 210	Academic Writing II	3	
DCIT 201	Programming I	3	
DCIT 203	Digital and Logic Systems Design	3	
DCIT 205	Multi Media and Web Design	3	
DCIT 207	Computer Organization and Architecture	3	
DCIT209	E-Business Architectures	3	
Total		18	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
UGRC 220	Introduction to African Studies	3	
DCIT202	Mobile Application Development	3	
DCIT204	Data Structures & Algorithm I	3	

DCIT206	Systems Administration	3	
DCIT208	Software Engineering	3	
Total		15	
Electives: Select 3-6 credits			
DCIT 200	Internship	1	
DCIT 212	Numerical and Computational Methods	3	
DCIT 214	Information Modeling and Specification	3	

LEVEL 300
FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 301	Operating Systems	3	
DCIT 303	Computer Networks	3	
DCIT 305	Database Fundamentals	3	
DCIT 313	Introduction to Artificial Intelligence	3	
DCIT 317	IT Project Management	3	
Total		15	
Electives: select 3-6 credits			
DCIT 307	Mini-Project	3	
DCIT 315	Principles of 3D Environment	3	
DCIT 321	Software Evolution	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 302	Human Computer Interaction	3	
DCIT 304	Research Methods	3	
DCIT 308	Data Structures and Algorithms II	3	
DCIT 312	Information Security Management	3	
DCIT 318	Programming II	3	
Total		15	
Electives: Select 3-6 credits			

DCIT 314	Game Engine Architecture	3	
DCIT 322	Database Management Administration	3	

LEVEL 400

FIRST SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 400	Project	3	
DCIT 401	Social, Legal, Ethical and Professional Issues	3	
DCIT 409	Digital Forensics	3	
Total		9	
Electives: Select 9-12 credits			
DCIT 413	Play and Games	3	
DCIT 415	Advanced Software Engineering	3	
DCIT 419	Agile Methods	3	
DCIT 421	Persuasive Systems Development	3	

SECOND SEMESTER

Code	Title	Credits	Pre-requisite
Core			
DCIT 400	Project	3	
DCIT 402	Management Principles in Computing	3	
DCIT 418	Systems and Network Security	3	
DCIT 428	Wireless Systems and Networks	3	
Total		12	
Electives: Select 3-6 credits			
DCIT 404	Advanced Databases	3	
DCIT 406	Advanced Computer Networks	3	
DCIT 408	Compilers	3	
DCIT 426	Telecommunication Systems	3	
DCIT 412	Computer Vision	3	
DCIT 414	Data Mining and Warehousing	3	
DCIT 416	Digital Signal Processing	3	
DCIT 422	Information Visualization	3	

COURSE DESCRIPTIONS

DCIT 200: Internship
Student in is now being recognized as adding value to student education. This non-scoring course provides students with opportunity to gain practical insight into the working world. Students will be encouraged to seek internship opportunities with companies. The idea is that this will help them come up with practical ideas for their project work.

DCIT 201: Programming I
This course is expected to give students the understanding of object-oriented methodology, the approach to modular and reusable software systems. Object orientation will be discussed from ground up, pointing out and explaining key concepts of object orientation, its justification and how it is applied in Software Engineering. Students will be exposed to at least four language implementation to the covered principles and concepts- Java, C#, Python and PHP. Topics include: Classes and Objects, Object Design and Programming – Encapsulation, Abstraction, Inheritance, Polymorphism, Composition, Aggregation, Method overloading, Interfaces, Exception Handling, Collections, etc. This course will ensure that students have adequate practical exposure.

Reading List
Clarke, D. (2013). Beginning C# Object-Oriented Programming (2nd Edition). Apress,

Liang, D. Y. (2014). Intro to Java Programming, Comprehensive Version (10th Edition). Pearson.

Lutz, M. (2013). Learning Python (5th Edition). Sebastopol, CA 95472: O'Reilly Media, Inc.

Schildt, H. (2014). Java: The Complete Reference, Ninth Edition (9th Edition). McGraw- Hill Education.

Schildt, H. (2002). C++: The Complete Reference, Ninth Edition (4th Edition). McGraw-Hill Education.

DCIT 202: Mobile Application Development
This course studies the design and implementation of mobile applications for popular platforms including Blackberry, Android and Apple devices. The course will provide an overview of the various mobile platforms but will focus on developing applications for iPhone, iPod Touch and iPad. Programming topics covered will include an introduction to Objective-C, the XCode IDE and will focus on designing, implementing and running applications using the simulator for the various Apple devices. Students will leverage their object oriented programming skills for such things classes, objects, inheritance, exception handling, and graphical user interface design.

Reading List

Adelstein, F., Gupta, S. K.S., Richard III, G., & Shwiebert, L. (2014). Fundamentals of Mobile and Pervasive Computing. New York: McGraw-Hill Professional.

B'Far, R., & Fielding, R. T. (2014). Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML. New York: Cambridge University Press.

Kamal, R. (2010). Mobile Computing. New Delhi: Oxford University Press.

Poslad, S. (2009). Ubiquitous Computing: Smart Devices. Environments and Interactions. Chichester, U.K.: Wiley.

Talukder, A. K., & Yavagal, R. (2009). Mobile Computing: Technology, Applications, and Service Creation. New York: McGraw-Hill Professional.

DCIT 203: Digital and Logic Systems Design

This course will provide an overview of principles and Techniques of modern digital systems. This course exposes individuals to a wide array of classic as well as state of the art digital electronics technology. Topics Include: Introduction to numbers systems and codes, logics circuits, combinational and sequential logic, storage elements, digital arithmetic, integrated circuit logic families. An Overview of Technologies and Application of wide array of digital components used within state of the art IT Systems. An understanding of the applications of such digital devices embedded within telecommunications systems, storage systems, computing systems, multimedia systems, and computer networks.

Reading Lists:

Coughlin, T. M. (2010). Digital Storage in Consumer Electronics: The Essential Guide (Embedded Technology) (1st Edition). Burlington: Elsevier.

Floyd, T. L. (2013). Digital Fundamentals (10th Edition), Englewood Cliffs, NJ: Prentice Hall.

Kleitz, W. (2011), Digital Electronics: A Practical Approach (8th Edition), Englewood Cliffs, NJ: Prentice Hall.

Patterson, D. A., & Hennessy, J. L. (2012). Computer Organization and Design: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design). Amsterdam: Morgan Kaufmann.

Tocci, R. J., Widmer, N. & Moss, G. (2010). Digital Systems: Principles and Applications (11th Edition). Englewood Cliffs, NJ: Prentice Hall.

DCIT 204: Data Structures and Algorithms I

This course focuses on the fundamentals of computer algorithms, emphasizing methods useful in practice. Using the big-O notation, algorithms are classified by their efficiency. We look into basic algorithm strategies and approaches to problem solving. Some of these approaches include the divide and conquer method, dynamic programming, and greedy programming paradigms. Sorting and searching algorithms are discussed in detail as they form part of a solution to a large number of problems solved using computers. The course also provides an introduction to the graph theory and graph algorithms as they are also used in many computer-based applications today.

Reading List:

Aho, A. V., Hopcroft, J. E., & Ullman, J. D. (2010).The Design and Analysis of Computer Algorithms. Reading, Mass.: Addison-Wesley.

Cormen, T. H., Leiserson C. E., Rivest R. L., & Stein, C. (2013). Introduction to Algorithms. Cambridge, Mass.: The MIT Press.

Dasgupta, S., Papadimitriou, C. H., & Vazirani, U. (2012). Algorithms. Boston: The McGraw-Hill Companies.

Goodman, S. E., & Hedetniemi, S. T. (2012). Introduction to the Design and Analysis of Algorithms. New York: Mcgraw-Hill College.

Levitin, A. (2011). Introduction to the Design and Analysis of Algorithms (3rd Edition). Harlow: Addison Wesley.

DCIT 205: Multimedia and Web Design

This course delivers sound training in the latest web technologies that are relevant to build modern and feature-rich web applications. It provides insight into state-of-the-art web design practice and introduces emerging topics in web development, such as package management and version control. The course features an introduction to the building blocks of the web – HTML, CSS and JavaScript. Topic include: Introduction to HTML, CSS and JavaScript, understanding frameworks and tools for modern web development, exploring CSS frameworks – bootstrap and foundation, exploring JavaScript frameworks – VueJS, AngularJS, ReactJS, NodeJS, package management with npm and a gentle introduction to version control using github.

Reading List

Crockford, D. (2008). JavaScript: The Good Parts, Sebastopol, CA 95472: O'Reilly Media, Inc.

Dayley, B. (2014). Node.js, MongoDB, and AngularJS Web Development (1st Edition). One Lake Street, Upper Saddle River, New Jersey 07458: Addison-Wesley.

Deitel, P. J., Dietel, H. M., & Dietel, A. (2013). Internet and World Wide Web How To Program (5th Edition.). Englewood Cliffs, N.J: Prentice Hall.

Duckett, J. (2011). HTML and CSS: Design and Build Websites (1st Edition). John Wiley & Sons.

Hogan, B. P. (2013). HTML5 and CSS3: Develop with Tomorrow's Standards Today (Pragmatic Programmers). NC: Pragmatic Bookshelf.

DCIT 206: Systems Administration

This course provides students with the skills and concepts that are essential to the administration of operating systems, networks, software, file systems, file servers, web systems, database systems, and system documentation, policies, and procedures. This also includes education and support of the users of these systems. Topics include: Installation Configuration Maintenance (service packs, patches) Server services, Client services Support, Installation Configuration, Server services (database, web, network services, Content management and deployment, Server administration and management, User and group management, Backup management Security management Disaster recovery Resource management Automation management.

Reading List:

Æleen Frisch (2011). Essential System Administration (O'Reilly) (3rd Edition).

Thomas, A. L., Christine, H., & Strata, R. C. (2012). The Practice of System and Network Administration (2nd Edition). Addison-Wesley

Chuck, E. (2013). Essential Linux Administration: A Comprehensive Guide for Beginners, (Cengage Press).

Mark, B. (2003). Principles of Network and System Administration (2nd Edition). J. Wiley & Sons.

Thomas, A. L. (2015). Time Management for System Administrators (O'Reilly).

DCIT 207 Computer Organization and Architecture

Students will acquire an understanding and appreciation of a computer system's functional components, their characteristics, performance, interactions and in particular, the challenge of harnessing parallelism to sustain performance improvements now and into the future. In selecting a system to use, students should be able to understand the tradeoff among various components, such as CPU clock speed, cycles per instruction, memory size, and average memory access time. Topics include: Basic organization of von Neumann machine, Instruction sets, format and types, Assembly/machine language programming, Addressing modes, Subroutine call and return mechanisms, I/O and interrupts, Shared memory multiprocessors/multicore organization, Memory Organization and Architecture.

Reading List

Hamacher, C., Vranesic, Z., Zaky, S., & Manjikian, N. (2011). Computer Organization and Embedded Systems. New York: McGraw-Hill Science.

Hayes, J. P. (2012). Computer Architecture and Organization. New York: McGraw-Hill Science.

Null, L. (2013). The Essentials of Computer Organization and Architecture. Sudbury, MA: Jones and Bartlett Publishers, Inc.

Patterson, D. A., & Hennessy, J. L. (2012). Computer Organization and Design: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design). Amsterdam: Morgan Kaufmann.

Stallings, W. (2011). Computer Organization and Architecture: Designing for Performance (8th Edition). Englewood Cliffs, N.J: Prentice Hall.

Shiva, S. G. (2011). Computer Organization, Design, and Architecture (4th Edition). Boca Raton:

DCIT 208: Software Engineering

The course covers the basics of software engineering. The basic foundation and concepts are to be covered. This course covers the software development process, from software characteristics to programming practices. A variety of concepts, principles, techniques, and tools are presented, encompassing topics are Characteristics of Software, software environments, major players in software engineering, software myths, software realities, product vs processes, Risks, project lifecycles, software processes, project management, people management, software requirements, analysis and specification, design software requirements, system models, architectural and detailed design, user interface design, programming practices.

Reading List

Booch, G., Rumbaugh, J., & Jacobson, I. (2015). The Unified Modelling Languages Users Guide (5th Edition). Upper Saddle River, NJ. Addison Wesley Professional.

Braude. E. J., & Bernstein, M. E. (2010). Software Engineering: Modern Approaches. New York: Wiley.

Ian, S.,(2011). Software Engineering (9th Edition). Addison-Wesley.

Pressman, R. (2010). Software Engineering (7th Edition). Boston, Massachusetts: McGraw Hill,

Lecture notes: include presentations that will be made available by the instructors and notes that you will take during lectures

DCIT209: E-Business Architectures

This course will introduce the concepts, vocabulary, and procedures associated with ECommerce and the Internet. Student shall be introduced to the fundamentals of e-buisness and its relevance to modern business. Topics will include: the evolution of the Internet and ECommerce, features of Web sites and the tools used to build an E-Commerce web site, marketing issues, payment options, security issues, and customer service. B2B, B2C, Ecommerce, supply-chain, emerging business models shall also be discussed.

Reading List

Beynon-Davies, P. (2004). E-Business. Palgrave, Basingstoke.

Evi, N., Garth, S., Trent, R., & Hein, B. W. (2010). UNIX and Linux System Administration Handbook (4th Edition). Prentice Hall.

Kenneth, C. L., Carol, G. T., Carol, G. T. E-commerce: Business, Technology, Societ.y United States.

Lowry, P. B., Cherrington, J. O., Watson, R. J. (2001). E-Business Handbook. Boca Raton, FL: CRC Press.

Pettit, R. (2012). Learning from Winners: How the ARF Ogilvy Award Winners Use Market Research to Create Advertising Success. Taylor & Francis.

DCIT 212: Numerical and Computational Methods

This course will study iterative methods for solving nonlinear equations; direct and iterative methods for solving linear systems; approximations of functions, derivatives, and integrals; error analysis. The course will take students through Solving Numerical Algebraic and Transcendental Equations, Bisection Methods, False Position Method, Newton Raphson Method, Successive Approximation Method, Simultaneous Linear Algebraic Equations, Gauss Elimination Method, Jacobi Method. There will also be a significant programming component in the course. Students will be expected to implement a range of numerical methods in homework assignments to get hands-on experience with modern scientific computing. In-class demos will be performed with Matlab and/or Python.

Reading List

Cheney, W., Kincaid, D. (2004). Numerical Mathematics & Computing (5th Edition). Brooks/Cole.

Greenbaum, & Chartier, T. P. (2012). Numerical Methods: Design, Analysis and Computer Implementation of Algorithms. Princeton University Press.

Moler, (2004). Numerical Computing with MATLAB. SIAM.

Michael, T. H., McGraw-Hill, E. (2001). Scientific Computing: An Introductory Survey (2nd Edition).

Richard, L. B., & Faires, J. D. Numerical Analysis (8th Edition). Student Edition:

DCIT 214: Information Modeling and Specification

The course introduces the area of database systems. The course will tackle modeling issues and the translation of models into relational tables. We will introduce the basics of querying databases and, in particular we will see the syntax and composition of SQL queries. At the end of this course students should understand the role of analysis and design in the software engineering lifecycle, develop object-oriented designs by applying established design principles, develop use-case and scenario descriptions of the requirements, develop descriptions of design models using UML diagrams, understand the role and influence of design patterns and frameworks in software design.

Reading List

Blaha, M., & Rumbaugh, J. (2005). Object-Oriented Modeling and Design with UML (2nd Edition). Prentice-Hall.

Fowler, M. (2004). UML Distilled: A Brief Guide to the Standard Object Modeling Language (3rd Edition). Pearson Education Inc.

Gamma, E., Helm, R., Johnson, R., & Vlissides, J. Design Patterns: Elements of Reusable Object-Oriented Software. Addison-Wesley.

Halpin, T. & Morgan, T. (Mar 2008). Information Modeling and Relational Databases (2nd Edition). Elsevier Inc.

Ramakrishnana, R., & Gehrk, J. (2002). Database Management Systems (2nd Edition). McGraw Hill.

DCIT 301: Operating Systems

This course will study basic principles of operating systems: addressing modes, indexing, relative addressing, indirect addressing, stack maintenance; implementation of multitask systems; control and coordination of tasks, deadlocks, synchronization, mutual exclusion; storage management, segmentation, paging, virtual memory; protection, sharing, access control; file systems; resource management; evaluation and prediction of performance. Introduction to operating systems. Topics Include: Threads and Processes; Interprocess Communication, Synchronization; CPU Scheduling; Memory Management; File and I/0 Systems; Protection and Security; Distributed System Structures; Distributed Coordination; Fault Tolerance, Real-time Computing.

Reading List

Coulouris, G., Dollimore, J. & Kindberg, T. (2015). Distributed Systems: Concepts and Design. Harlow, England: Addison-Wesley.

Flynn, I. M., & McHoes, A. (2013). Understanding Operating Systems. Cambridge, Mass: Course Technology.

Silberschatz, A., Galvin, P. B., & Gagne, G. (2012). Operating System Concepts. Hoboken, N.J.: John Wiley & Sons.

Stallings, W. (2011). Operating Systems: Internals and Design Principles (7th Edition). Boston, MA: Pearson Custom Publishing.

Tanenbaum, A. S. (2014). Modern Operating Systems. Upper Saddle River, N.J.: Pearson Prentice Hall.

DCIT 302: Human-Computer Interaction (HCI)

Human-Computer Interaction (HCI) is concerned with designing interactions between human activities and the computational systems that support them, and with constructing interfaces to afford those interactions. This course illustrates the principles of user interface design, development, and programming. Topics Include: User psychology and cognitive science, menu system design, command language design, icon and window design, graphical user interfaces, web-based user interfaces. Principles of user interface design. Concepts for objectively and quantitatively assessing the usability of software user interfaces, designing Interaction, Programming Interactive Systems, User-Centered Design and Testing, New Interactive Technologies, emerging technologies are discussed.

Reading List:

Dix, A., Finlay, J. E., Abowd, G. D. & Beale, R. (2013). Human-Computer Interaction (3rd Edition). Upper Saddle River, NJ: Pearson.

Jacko, J. A. (2012). Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications (Human Factors and Ergonomics). Boca Raton: CRC Press.

Johnson, J. (2010). Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules (1st Edition). Amsterdam: Morgan Kaufmann Publishers/Elsevier,

Preece, J., Rogers, Y., Sharp, H., Benyon, D., Holland, S., & Carey, T. (1994). Human Computer Interaction: Concepts and Design (Ics S.). Wokingham: Addison Wesley.

Shneiderman, B., Plaisant, C., Cohen, M. & Jacobs, S. (2012), Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition), Boston, MA: Addison Wesley.

DCIT 303: Computer Networks

This course covers both the Introduction to Networks and Routing and Switching Essentials in CCNA. The principles of IP addressing and fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for the curriculum. At the end of the course students will be able to build simple LANs, perform basic configurations for routers and

switches, and implement IP addressing schemes, configure and troubleshoot routers and switches and resolve common issues with RIPv1, RIPv2, single-area and multi-area OSPF, virtual LANs, and inter-VLAN routing in both IPv4 and IPv6 networks.

Reading List:
Cisco Networking Academy Program, CCNA 1 and 2 Companion Guide, Revised 3rd Edition). Cisco Systems.

Cisco Networking Academy Program, CCNA 1 and 2 Lab Companion, Revised (3rd Edition). Cisco Systems.

Cisco Systems Inc. Cisco Networking Academy Program, CCNA 1 and 2 Engineering Journal and Workbook, Revised (3rd Edition).

McDonald, R. & Odom, W. Cisco Networking Academy, Routers and Routing Basics CCN A 2 Companion Guide. Cisco System.

Odom, W. & Knott, T. Cisco Networking Academy, Networking Basics CCNA 1 Companion Guide, Cisco System.

DCIT 304: Research Methods
This course examines different methods of acquiring knowledge, role of economic research, identification of a research problem and stating of research questions and hypotheses. Also review of literature, meaning, purpose and principles of research designs and the measurement design will be examined. The course further acquaints students with the method of data collection and analysis; descriptive and inferential statistics; interpretation of data and proposal and research writing.

Reading List
Cairns, P., & Cox, A. L. (2012). Research Methods for Human-Computer Interaction. Cambridge: Cambridge University Press.

Lazar, J., Feng, J. H., & Hochheiser, H. (2010). Research Methods in Human-Computer Interaction. West Sussex: Wiley.

Lewis, R. J., & Sauro, J. (2012). Quantifying the User Experience: Practical Statistics for User Research. San Diego: Morgan Kaufmann.

Unger, R, & Warfel, T. Z. (2012). Guerrilla UX Research Methods: Thrifty, Fast, and Effective User Experience Research Techniques. San Diego: Morgan Kaufmann.

Vaishnavi, V. K., & Kuechler, W. (2011). Design Science Research Methods and Patterns: Innovating Information and Communication Technology. Boca Raton: Auerbach Publications.

DCIT 305: Database Fundamentals

In this course, students will be introduced to relational database concepts, E/R diagrams, normalization, structured query language (SQL). Students will write and execute queries and sub-queries, create database objects (tables. views, indices, sequences, functions, triggers, stored procedures), and manipulate data in tables. Topics covered in this course will include: Database Concepts and Architecture, Database Modelling and Design, Entity-Relationship Model, Normalization, Data Manipulation Language (DML), Data Definition Language (DDL), Data Control Language (DCL), Sub-queries, Multiple Tables, Database Views, Database Triggers, Stored Procedures, Decision and Control Structures, PL/SQL, and Transaction Processing.

Reading List

Gillenson, M. L. (2011). Fundamentals of Database Management Systems. New York: Wiley.

Kroenke, D. M. (2013). Database concepts. Upper Saddle River, NJ: Prentice Hall.

Post, G. V. (2015). Database Management Systems. Boston, Mass.: Richard D Irwin, Inc.

Pratt, P. J., & Adamski, J. J. (2011). Concepts of Database Management. Cambridge, Mass: Course Technology.

Teorey, T. J., Lightstone, S. S., Nadeau, T., & Jagadish, H. V. (2011).Database Modeling and Design (5th Edition). San Diego: Morgan Kaufmann.

DCIT 306: Cloud Computing

This course provides a hands-on comprehensive study of Cloud concepts and capabilities across the various Cloud service models IaaS, PaaS, SaaS, and Business Process as a Service (BPaaS). IaaS topics start with a detailed study the evolution of infrastructure migration approaches from VMWare/Xen/KVM virtualization, to adaptive virtualization, and Cloud Computing/on-demand resources provisioning. Mainstream Cloud infrastructure services and related vendor solutions are also covered in detail. PaaS topics cover a broad range of Cloud vendor platforms including AWS, Google App Engine, Microsoft Azure, Eucalyptus, OpenStack as well as storage services that leverage Google Storage, Amazon S3, Amazon Dynamo.

Reading List

Bhowmik, S. (2017). Cloud Computing (1st Edition). Cambridge University Press.

Bahga, A. & Madisetti, V. (2014). Cloud Computing: A Hands-On Approach.

Erl, T., Puttini, R., & Mahmood, Z. (2013). Cloud Computing: Concepts, Technology & Architecture (1st Edition). Arcitura Education Inc.

Goyal, A. (2017). Cloud Computing: A step-by-step approach while learning Cloud Computing concepts.: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More.

Rafaels, J. R. (2015). Cloud Computing: From Beginning to End, Paperback.

DCIT 307: Mini-Project

Students use information technology as a tool to redesign business processes so the enterprise can achieve its objectives. Student teams analyze the business processes of real organizations, quantify the negative impact caused by current process challenges, then develop and present a compelling Business Case for Change. Students develop skills critical for preparing and delivering effective verbal briefings and presentations.

Reading List

Hallows, J. (2015), Information Systems Project Management: How to Deliver Function and Value in Information Technology Projects (2nd Edition). New York: AMACOM.

Marchewka, J. T. (2013), Information Technology Project Management (3rd Edition). New York: Wiley.

Phillips, J. (February 25, 2010), IT Project Management: On Track from Start to Finish (3rd Edition), McGraw-Hill Osborne Media.

Schwalbe, K. (2010). Information Technology Project Management, Revised (6th Edition). Cambridge, MA: Course Technology.

DCIT 308: Data Structures and Algorithms II

This course covers further topics in data structures and the algorithms required for their implementation. Data structures include heaps and search, splay, and spanning trees. Analysis techniques include asymptotic worst case, expected time, amortized analysis, and reductions between problems. Include Generic types, Linked lists, Stacks and queues, Binary trees, Balanced binary trees, Multi-way trees, B-trees and B+-trees, File organization, Searching and sorting, Hashing. Running time analysis of algorithms and their implementations, onedimensional data structures, trees, heaps, additional sorting algorithms, binary search trees, hash tables, graphs, directed graphs, weighted graph algorithms.

Reading List

Cormen, T. H., Leiserson, C. E., Rivest, R. L., & Stein, C. (2009). Introduction to Algorithms. Cambridge, Mass. The MIT Press.

Deitel, H. M. & Deitel, P. J. (2014). Java: How to Programme: Late Objects Version (8th Edition). Upper Saddle River, NJ: Pearson Prentice Hall,

Kruse, R. L. & Ryba, A. (2012). Data Structures and Program Design in C++ (1st Edition). Upper Saddle River, NJ: Prentice Hall.

Lewis, J., DePasquale, P. & Chase, J. (2010), Java Foundations: Introduction to Program

Design and Data Structures (2nd Edition). Harlow: Addison Wesley,

Malik, D. S. (2012). C++ Programming: Program Design Including Data Structures (6th Edition). Cambridge, MA: Course Technology.

DCIT 309: Embedded Systems and Internet of Things

This course aims at teaching students the fundamental principles underpinning the design and construction of devices through the theory and practice of embedded systems. Topics Include: Embedded Systems Architecture and design; Middleware and Application Software; Embedded software; Embedded hardware; Embedded Processor, Board Memory, Board Buses, Board Input/Output. Students will learn about sensor operation, signal acquisition, the role of measurement uncertainty and noise, common sensor communication interfaces and how they interact with modern embedded microcontrollers Other topics in this course are components of IoT devices, IoT design considerations and constraints, design trade-offs between hardware and software, IoT device and the Internet.

Reading List

Berger, A. & Berger, A. S. (2010). Embedded Systems Design: An Introduction to Processes, Tools and Techniques. Oxford, England: Newnes.

Catsoulis, J. (2015). Designing Embedded Hardware. Beijing: O'Reilly Media.

Charalampos, D. (2012). Building Internet of Things with the Arduino (1st Edition). CreateSpace Independent Publishing Platform.

Noergaard, T. (2013). Embedded Systems Architecture: A Comprehensive Guide for Engineers and Programmers. Amsterdam: Newnes.

Peckol, J. K. (2012). Embedded Systems: A Contemporary Design Tool. Hoboken, NJ: Wiley.

DCIT 311: Machine Learning

In this introductory course covers the basic theory and algorithms that form the core of machine learning. Machine Learning draws on concepts and results from many fields and forms a key technology in Big Data, and in many financial, medical, commercial, and scientific applications. Topics covered in this course are The Learning Problem, The Linear Model I, Error and Noise, Training versus Testing, Theory of Generalization, The VC Dimension, Bias-Variance Tradeoff, Neural Networks, Overfitting, Regularization, Validation, Support Vector Machines, decision trees, Kernel Methods, Radial Basis Functions, Learning Principles, Deep Learning, Epilogue.

Reading List

Andreas, C. M., Sarah, G. (2016), Introduction to Machine Learning with Python: A Guide for Data Scientists (1st Edition). Publisher: O'Reilly Media.

Aurélien, G. (2017), Hands-On Machine Learning with Scikit-Learn and TensorFlow:

Concepts, Tools, and Techniques to Build Intelligent Systems, (1st Edition). Publisher: O'Reilly Media, Paperback.

Ian, G., Yoshua, B., Aaron, C. (2016), Deep Learning (Adaptive Computation and Machine Learning series), (1st Edition). MIT Press Publishing.

John, D. K., Brian, M.N., Aoife, D. (2015), Fundamentals of Machine Learning for Predictive Data Analytics: Algorithms, Worked Examples, and Case Studies (MIT Press), (1st Edition). MIT Press.

Yaser, S. A. M., Malik, M. I., Hsuan-Tien, L. (2012), Learning From Data Hardcover (1st Edition). Publisher: AMLBook, pages.

DCIT 312: Information Security Management

This course covers the range of concepts, approaches and techniques that are applicable in Information Security Management Principles. Students are required to demonstrate their knowledge and understanding of these aspects in Information Security Management Principles. It provides the opportunity for those already within these roles to enhance or refresh their knowledge. Key areas are: Knowledge of the concepts relating to information security management, Understanding of current national legislation and regulations which impact upon information security management, Awareness of current national and international standards, frameworks and organizations which facilitate the management of information security.

Reading List

Alexander, D., Finch, A., Sutton, D., & Taylor A. (2013). Information Security Management Principles (2nd Edition). BSC Learning and Development Limited.

Hanley, R. O., & Tiller, J. S. (2013). Information Security Management Handbook (7th Edition). Auerbach Publications.

Krause, M., & Tipton, F. H. (2007). Information Security Management Handbook (6th Edition). Taylor & Francis Group.

Serwin, A. B., McLaughlin, P., & Tomaszewski, (2014). Privacy, Security and Information Management: An Overview.

Whitman, M. E., & MattordH, J. (2016). Management of Information Security (5th Edition). Cengage Learning.

DCIT 313: Introduction to Artificial Intelligence

This course will cover the theory and practice of developing systems that exhibit the characteristics we associate with intelligence in human behavior such as reasoning, planning and problem solving, learning and adaptation, natural language processing, and perception. Basic problem-solving strategies, heuristic search, problem reduction and AND/OR graphs, knowledge representation, uncertainty reasoning, game playing, planning, machine learning,

computer vision, and programming systems such as Lisp or Prolog. Topics include state space search, logic, and resolution theorem proving. Application areas may include expert systems, natural language understanding, planning, machine learning, or machine perception.

Reading List

Brighton, H., & Selina, H. (2013). Introducing Artificial Intelligence. Toronto: Totem Books.

Carter, M. (2012). Minds and Computers: An Introduction to the Philosophy of Artificial Intelligence. Edinburgh: Edinburgh University Press.

Ertel, W., & Black, N. T. (2011). Introduction to Artificial Intelligence. Berlin: Springer.

Jackson, P. C. (2014). Introduction to Artificial Intelligence (2nd Edition). New York: Dover Publications.

Russell, S., & Norvig, P. (2009). Artificial Intelligence: A Modern Approach (3rd Edition). Upper Saddle River, N.J: Prentice Hall.

DCIT 314: Game Engine Architecture

This course provides students with an introduction to the theory and practice of video game programming. Students will participate in individual hands-on lab exercises, and also work together like a real game development team to design and build their own functional game using an existing game engine (e.g. XNA) and also by designing and implementing engine subsystems and integrating 3rd party components. Topics would include real-time programming and the game loop, human interface devices, 3D rendering, collision detection, skeletal animation, rigid body dynamics, game object models, event-driven programming, game scripting languages.

Reading List:

Adams, E., & Joris, D. (2012). Game Mechanics Advanced Game Design. Berkeley, Calif: New Riders,

Jason, G., Game Engine Architecture. AK Peters.

Mike, M., Game Coding Complete (3rd Edition). Cengage Learning, 2012, ISBN:

Robert, N. (2014). Game Programming Patterns. Genever Benning,

Sanjay, M. (2013). Game Programming Algorithms and Techniques: A Platform-agnostic Approach, Addison-Wesley.

DCIT 315: Principles of 3D Environment

This an introductory course focusing on 3D concepts for game play, modeling, and programming with a view on current and future technologies for electronic game design. Topics include graphics, game scripting, game engines, motion control, narrative in games,

game interfaces, artificial intelligence, music and sound, "Serious Games" and social and interface issues of game development. The course explores game engine software framework to design and implement games, animation techniques, physics simulation, user controls, graphical methods, and intelligent behaviors. Students will finally be introduced to Game Studio for control of objects and interactions in 2D and 3D game worlds.

Reading List

Andy, B. (2012). 3D Animation Essentials (1st Edition). Sybex publishing.

Brian, M., Mike, B., Sean, D., Eric, V. K., & Anthony, U. (2016). Unity Games by Tutorials: Make 4 Complete Unity Games from Scratch Using C#. Razeware LLC Publishing.

Frank, L. (2012). Introduction to 3D Game Programming with DirectX. Mercury Learning & Information publishing.

Jeremy, G. B. (2017). Introduction to Game Design, Prototyping, and Development: From Concept to Playable Game with Unity and C#. (2nd Edition). Addison-Wesley Professional publishing.

John M. B. (2016). The Complete Guide to Blender Graphics: Computer Modeling & Animation, (3rd Edition). A K Peters/CRC Press.

DCIT 316: Computational models for Social Media Mining

This course will introduce students to computational methods for extracting social and interactional meaning from large volumes of text and speech (both traditional media and social media). The use of computational techniques to model social phenomena and the use of data analytics to learn models of (and to predict) social phenomena using real data will be taught. Topics will include: Sentiment Analysis, Emotion and Mood Analysis, Belief Analysis and Hedging, Deception Detection, Argumentation Mining and Social Power analysis.

Reading List:

Easley, D., & Kleinberg, J. Networks, Crowds, and Markets: Reasoning About a Highly Connected World. Cambridge University Press.

Kleinberg, J. C., (2007). Behavior in Networks: Algorithmic and Economic Issues. In Algorithmic Game Theory (N. Nisan, T. Roughgarden, E. Tardos, V. Vazirani, Editions.), Cambridge University Press.

Leskovec, J., Huttenlocher, D., & Kleinberg, J. (2010). Signed Networks in Social Media. Proc. 28th ACM SIGCHI Conf. on Human Factors in Computing Systems (CHI).

Leskovec, J., Backstrom, L. & Kleinberg, J. (2009) Meme-tracking and the dynamics of the news cycle. Proc. 15th ACM SIGKDD Intl. Conf. on Knowledge Discovery and Data Mining.

Philipp, K. J. (2010). Data Analysis with Open Source Tools. O'Reilly Media.

DCIT 317: IT Project Management

This course is mainly designed to prepare IT project managers, novice or experienced, with project management skills needed to better manage IT projects. Built along the IT project management lifecycle, this course covers detailed topics of the basic concepts of IT project management, including initiating, planning, controlling, executing, and closing projects. The course also shows how IT projects should be managed, from inception to post implementation review. The audience who take this course will likely improve their management skills and abilities to define the project scope, create a workable project plan, and manage within the budget and schedule.

Reading List

Kerzner, H. (2013). Project Management: A Systems Approach to Planning, Scheduling, and Controlling (11th Edition). Wiley.

Lientz, B. P. (2011). Information Technology Project Management. Palgrave Macmillan.

Marchewka, J. T. (2016). Information Technology Project Management (5th Edition). Wiley.

Schwalbe, K. (2014). Information Technology Project Management (7th Edition). Cengage Learning.

Wideman, R. M. (2006). A Management Framework for Project, Program and Portfolio Integration.

DCIT 318: Programming II

The course introduces students to advanced application software development using Microsoft application development platform. It teaches students how to design desktop and web based application software using the design tools available in Microsoft Visual Studio. Topics to covered in this course are introduction to C# Syntax, Methods, Classes and Inheritance, Exceptions handling and Monitoring, UI design using windows forms, controls, menus, and toolbar, Reading and writing files on to local disk and Accessing a Database using ADO.Net, LINQ and Entity Data Models, Accessing Remote Data using the types in the System.Net namespace, and WCF Data Services, UI design using XAML.

Reading List

Adam, F. (2013). Pro ASP.NET MVC 5 (Expert's Voice in ASP.Net) (5th ed). Apress Publisher.

Ben, A. (2017). C# 7.0 in a Nutshell: The Definitive Reference (1st Edition). O'Reilly Media Publishers.

Jesse, L., Jon, G. & Philip, J. (2014). Pro Windows 8.1 Development with XAML and C# (1st Edition). Apress publishing.

Jon, G., Brad, W. & Scott, K. A., & David. (2014). Professional ASP.NET MVC 5 (1st ed.). Wrox publishing.

Sergii, B. (2016). Developing Windows 10 Applications with C# Paperback, CreateSpace. Independent Publishing Platform.

DCIT 319: Discrete Structures

The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering. Students will learn logic and proof, sets, functions, as well as algorithms and mathematical reasoning. Key topics to be covered include Propositional Logic, Predicate Logic and Quantification, Methods of Proof, Sets and Functions, Arithmetic Algorithms, Growth of Functions, Computational Complexity of Algorithms, Integer properties and Matrices, Mathematical Induction, Recursion, Sequences and Summations, Program Correctness, Graphs and its Applications, Trees and its Applications, Languages and Grammars, Finite-State Machines, Automata and Language Recognition and Turing Machines.

Reading List

Bernard, K., Robert, B. & Sharon, C. R. (2017). Discrete Mathematical Structures (6th Edition). Pearson publishing.

Harriet, F., & Javed, A. A. (2016). Discrete Structures (1st Edition). Cognella Academic Publishing.

Judith, L. G. (2014). Mathematical Structures for Computer Science. (7th Edition). W. H. Freeman publishing.

Kenneth, H.R. (2011). Discrete Mathematics and Its Applications (7th Edition). McGraw-Hill Higher Education

Vatsa, B.S., & Suchi, V. Discrete Structures. (4th Edition). New Academic Science Ltd publishing.

DCIT 321: Software Evolution

Software evolution plays a key role in software development. In most case programmers do not build software from scratch as rather they modify existing software to provide new features to customers and fix defects in existing software. Evolving software systems is often a time-consuming and error-prone process. This course will focus on the fundamentals of state-of-the art methods, tools, and techniques for evolving software based on the current software engineering research literature. Students will be expected to read current literature on software evolution since the course will be discussion based.

Reading List

Mens, D. (2008). Software Evolution Springer.

Mens, T. (2008). Introduction and Roadmap: History and Challenges of Software Evolution. In: Software Evolution. Springer, Berlin, Heidelberg

Lehman, M. M. (1980)."Programs, life cycles, and laws of software evolution," in Proceedings of the IEEE, vol. 68, no. 9.

Lehman, M. M., Ramil, J. F., Wernick, P. D., Perry, D. E., & Turski, W. M. (1997)."Metrics and laws of software evolution-the nineties view." Proceedings Fourth International Software Metrics Symposium, Albuquerque, NM,

Pressman, R. (2010). Software Engineering (7th Edition). Boston, Massachusetts: McGraw Hall.

DCIT 322: Database Management Administration

This course will study overview of database systems, Introduction to Database Design; The Relational Model Relational Algebra SQL Database Application Development; Storage and Indexing; Tree-Structured Indexing; Hash-Based Indexing; Schema Refinement and Normalisation object oriented database languages; the relational database model with introductions to SQL and DBMS; hierarchical models and network models with introductions to HDDL, HDML, and DBTG Codasyl; data mining; data warehousing; database connectivity; distributed databases; the client/server paradigm; middleware, including ODBC, JDBC, CORBA, and MOM.

Reading List

Coronel, C., Morris, S., & Rob, P. (2009). Database Systems: Design, Implementation and Management. Australia: Course Technology.

Gillenson, M. L. (2011). Fundamentals of Database Management Systems. New York: Wiley.

Kroenke, D. M. (2013). Database concepts. Upper Saddle River, NJ: Prentice Hall.

Post, G. V. (2015). Database Management Systems. Boston, Mass.: Richard D Irwin, Inc.

Teorey, T. J., Lightstone, S. S., Nadeau, T., & Jagadish, H. V. (2011). Database Modeling and Design (5th Edition). San Diego: Morgan Kaufmann.

DCIT 400: Project

The project work provides students with experience in carrying out a significant computer science project from conception to completion with minimal supervision and assistance. It comprises of the design, implementation and documentation of a significant software or hardware system, but theoretical investigations are equally valid. Other project ideas which do not fall into any of these categories are also possible. A faculty member and the student

will agree on a topic and appropriate scope of work before the project begins. All project work must be done independently by individual students.

Reading List

Berndtsson, M., Hansson, J., Olsson, B., & Lundell, B. (2013). Thesis Projects: A Guide for Students in Computer Science and Information Systems. Berlin: Springer.

Dennis, A., Wixom, B. H., & Tegarden, D. (2012). Systems Analysis and Design with UML. New York: Wiley.

Fincher, S., Petre, M., & Clark, M. (2011). Computer Science Project Work: Principles and Pragmatics. Berlin: Springer.

Pilone, D., & Miles, R. (2014). Head First Software Development. Sebastopol, CA: O'Reilly Media.

Wiegers, K. (2010). Software Requirements 2. Redmond, Wash: Microsoft Press.

DCIT 401: Social, Legal, Ethical and Professional Issues

This course will study legal, social, and ethical issues surrounding software development and computer use. It will give an overview of the subject aimed at raising students' awareness about ethics in Information Technology and in research. Professional conduct, social responsibility and rigorous standards for software testing and reliability will be stressed. Issues such as Cyberspace Privacy Laws and Issues, Cyberspace Free Speech Laws and Issues, liability, intellectual property laws and issues, security and crime will be examined in the context of computer use, Professionalism and Work Place issues in the IT field, Contracts and Leadership

Reading List

Baase, S. (2015). A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet (3rd Edition). Upper Saddle River, NJ: Prentice Hall.

Floridi, L. (2010). The Cambridge Handbook of Information and Computer Ethics. Cambridge, UK: Cambridge University Press.

Johnson, D.G. (2009). Computer Ethics (4th Edition). Upper Saddle River, N.J.: Prentice Hall.

Plotkin, R. (2011). Computer Ethics (Computers, Internet, and Society). New York: Facts on File, Inc.

Quinn, M. J. (2010). Ethics for the Information Age (4th Edition). Harlow: Addison Wesley.

DCIT 402: Management Principles in Computing

This course presents the basics of the theory and science of management. Students will understand the fact that managing is a part of a larger system interacting with a manager's

total environment – economic, technological, social, political and ethnical. The functions of management – planning, organizing, staffing and leading, and controlling will provide the conceptual framework for students to increase their understanding of Ghanaian and global management challenges, ethical decision-making, technology management and emerging workplace issues. This course lays the foundation for an understanding of the nature and importance of managing and of management as a developed and important science.

Reading List

Benowitz, E. A. (2011). Principles of Management (Cliffs Quick Review). Lincoln, Neb: Cliffs Notes.

Carpenter, M., Bauer, T., & Erdogan, B. (2010). Principles of Management (Version 1.1.) Irvington, New York: Flat World Knowledge, Inc.

Griffin, R. W. (2010). Students Achievement Series: Principles of Management. Boston, Mass: Houghton Mifflin Company.

Hill, C. W. L., & McShane, S. (2010). Principles of Management. Boston: McGraw Hill/Irwin.

Rue, L. & Byars, L. (2008). Management: Skills and Application. Boston, Mass: McGraw Hill/Irwin.

DCIT 403: Designing Intelligent Agents

This course provides an overview of robot mechanisms, dynamics, and intelligent controls. It will cover: basic components of robotic systems; selection of coordinate frames; homogeneous transformations; solutions to kinematic equations; velocity and force/torque relations; manipulator dynamics in Lagrange's formulation; digital simulation of manipulator motion; motion planning; obstacle avoidance; controller design using the computed torque method; and classical controllers for manipulators of mobile robots, multi-rigid-body dynamics, 3D graphic simulation; control design, actuators, and sensors; wireless networking, task modeling, human-machine interface, and embedded software. Students will design and fabricate working robotic systems in a group-based term project.

Reading List

Craig, J. J. (2014). Introduction to Robotics: Mechanics and Control. Upper Saddle River, N.J.: Prentice Hall. ISBN-10: 0201543613, ISBN-13: 978-0201543612

Jazar, R. N. (2010). Theory of Applied Robotics: Kinematics, Dynamics, and Control (2nd ed.). Berlin: Springer. ISBN-10: 1441917497, ISBN-13: 978-1441917492

Niku, S. B. (2013). Introduction to Robotics: Analysis, Control, Applications. Hoboken, NJ: Wiley. ISBN-10: 0470604468, ISBN-13: 978-0470604465

Simpson, C. D., Santers, R., & Nikipierowicz, S. (2008). Introduction to Robotics. Panford: Logic Design Publishing. ISBN-10: 0968686028, ISBN-13: 978-0968686027

Spong, M. W., Hutchinson, S., & Vidyasagar, M. (2010). Robot Modeling and Control. Hoboken, NJ: Wiley. ISBN-10: 0471649902, ISBN-13: 978-0471649908

DCIT 404: Advanced Databases

This course introduces students to the skills necessary to become a Database administrator. Students will learn how to create an operational database and manage the structures in an effective and efficient manner, including performance monitoring, database security, user management, performance tuning, and backup/recovery techniques. Oracle Database management system will be used. Topics covered in this course will include: Database Architecture, installation configuration of the Oracle Network Environment, Managing Database Storage Structures, Administering User and Database Security, Oracle object management, Managing Concurrency & Locks, Undo Data, Network environment: oracle shared servers, performance monitoring & management, etc.

Reading List

Craig, S. M. (2013). Database Administration: The Complete Guide to DBA Practices and Procedures (2nd Edition).

Coronel, C., Morris, S., & Rob, P. (2010).Database Systems: Design, Implementation and Management. Australia: Course Technology.

Ignatius, F. (2015). Beginning Oracle Database 12c Administration: From Novice to Professional (2nd Edition). Apress.

John, W. (2014). OCA Oracle Database 12c Installation and Administration Exam Guide (Exam 1Z0-062) (Oracle Press) (2nd Edition). Oracle Press.

Michael, M. (2014). Database Design, Application Development, and Administration, (6th Edition).

DCIT 405: Statistical Models and Methods for Data Science

The course shall cover intermediate topics in probability and statistics required for data scientists to analyze and interpret data. Topics to be covered include : The probability theory and statistical inference used in data science; Probabilistic models, random variables, useful distributions, expectations, law of large numbers, central limit theorem; Statistical inference; point and confidence interval estimation, hypothesis tests, linear regression. Students shall use statistical tools such as XLMiner, SPSS, Ms Excel during lab sections.

Reading List

Chung, K.L. (2012). Elementary probability theory with stochastic processes. Springer Science & Business Media.

Jay, L. D. Probability and Statistics for Engineering and the Sciences (9th Edition).

Larry, W. "All of Statistics: A Concise Course in Statistical Inference Harchol-Balter "Performance Modeling and Design of Computer Systems: Queueing Theory in Action".

DeGroot M. H. & Schervish, M. J. (2012). Probability and Statistics (4th Edition). Publisher: Pearson.

DCIT 406: Advanced Computer Networks

This course covers Scaling Networks and Connecting Networks in CCNA. Scaling Networks describes the architecture, components, and operations of routers and switches in a large and complex network. Connecting Network discusses the WAN technologies and network services required by converged applications in a complex network. The course enables you to understand the selection criteria of network devices and WAN technologies to meet network requirements. Students will learn to configure routers and switches for advanced functionality, configure and troubleshoot network devices and resolve common issues with data link protocols how to implement IPSec and virtual private network operations in complex networks.

Reading List:

Cisco Networking Academy Program, CCNA 3 and 4 Companion Guide (3rd Edition).

Cisco Networking Academy Program, CCNA 3 and 4 Lab Companion (3rd Edition).

Cisco Networking Academy (2014). Scaling Networks Companion Guide. Cisco Press.

Heap, G. & Maynes L. CCNA Practical Studies, (2002), Cisco Press.

Johnson, A. & Cisco Networking Academy. (2017). Connecting Networks v6 Labs & Study Guide. Cisco Press.

DCIT 407: Image Processing

The course will cover techniques and tools for digital image processing, and finally also introduce image analysis techniques in the form of image segmentation. The course is primarily meant to develop on-hand experience in applying these tools to process these images. Hence the programming assignments form a key component of this course. The topics to be covered are: Digital image fundamentals: representation, sampling and quantization, image acquisition, basic relationships between pixels, imaging geometry; Image transforms: discrete Fourier transform, discrete cosine transform, Walsh and Hadamard transforms, Hotelling transform; Image enhancement: in spatial domain and in frequency domain, image smoothing and sharpening.

Reading List

Scott, E. U. (2011). Digital Image Processing and Analysis (2nd Edition). The CRC Press, Boca Raton, FL.

Scott, E. U. (2015). Computer Imaging: Digital Image Analysis and Processing . The CRC Press, Boca Raton, FL, January

Solomon, C.J., & Breckon, T.P. (2010). Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab. Wiley-Blackwell.

Umbaugh, S. E. (1012). Computer Vision and Image Processing: A Practical Approach Using CVIPtools. Prentice Hall PTR, Upper Saddle, NJ.

Wilhelm, B. & Mark, J. B. (2007). Digital Image Processing: An Algorithmic Approach Using Java. Springer.

DCIT 408: Compilers

This course will provide introduction to the field of compilers, which translate programs written in high-level languages to a form that can be executed. Students will learn the core ideas behind compilation and how to use software tools such as lex/flex, yacc/bison to build a compiler for a non-trivial programming language. The theory and practice of programming language translation, compilation, and run-time systems, organized around a significant programming project to build compiler for simple but nontrivial programming language. Modules, interfaces, tools. Topics Include: Compiler Design; Lexical Analysis; Syntax Analysis- grammars, LL(1) parsers, LR(1) parsers; Semantic Processing; Code generation and optimization.

Reading List

Aho, A. V., Sethi, R., Lam, M.S., & Ullman, J. D. (2013). Compilers: Principles, Techniques and Tools (2nd ed.). Boston: Prentice Hall.

Allen, R., & Kennedy, K. (2012). Optimizing Compilers for Modern Architectures: A Dependence-based Approach. San Francisco, Calif.: Morgan Kaufmann.

Louden, K. C. (2010). Compiler Construction: Principles and Practice. Boston: PWS Pub Co.

Mak, R. (2009). Writing Compilers and Interpreters: A Software Engineering Approach. New York: Wiley.

Mozgovoy, M. (2009). Algorithms, Languages, Automata, & Compilers: A Practical Approach. Sudbury, MA: Jones and Bartlett Publishers, Inc.;

DCIT 409: Digital Forensics

This course covers computer crime, relevant laws, agencies, and standards. It presents auditing, logging, forensics, and related software. It also explores legal principles such as chain of evidence, electronic document discovery, eavesdropping, and entrapment. Students get hands-on experience with forensics tools. Topics Include: The legal and technical aspects of computer forensics. Applicable laws and the roles of legal authorities. How to obtain and handle digital evidence and will have been exposed to a range of freeware forensic tools.

Reading List:

Arnes, A. (2017). Digital Forensics, Wiley.

EC-Council (2013), Computer Forensics: Investigation Procedures and Response (1st Edition), Cambridge, MA: Course Technology.

EC-Council, (2009), Computer Forensics: Hard Disk and Operating Systems EC-Council (1st Edition), Cambridge, MA: Course Technology.

Sammons, J, (2015). The Basics of Digital Forenics,2nd Edition. Elsevier Inc. ISBN: 978-0-12-801635-0

Wells, J. T. (January 9, 2009), Computer Fraud Casebook: The Bytes that Bite (1st Edition), New York: Wiley, ISBN-10: 0470278145, ISBN-13: 978-0470278147

DCIT 411: BioInformatics

The aim of this course is to introduce students to the computational techniques used in the field of bioinformatics. To reinforce the theory underlying the concepts and techniques of sequence analysis and post-genomic bioinformatics. The course introduces basic concepts of molecule biology, sequence analysis and genomic era biology. It introduces a number of many different tools and their usage, as well as the analysis algorithms behind some of them. Topics include: Basic concepts of molecular biology: genomes, transcripomes, proteomes. Sequence analysis: genome annotation, sequence alignment, multiple sequence alignment, Phylogenetic analysis, Protein families, Database searching tools.

Reading List

Jiang, T., Xu, Y. & Zhang, M.Q. (Eds), (2013). Current Topics in Computational Biology. MIT Press.

Lesk, A.M. (2008). Introduction to bioinformatics, Oxford: Oxford University Press, (3rd Edition)

Waterman, M.S., Deonier, R.C. & Tavaré, S. (2014), Computational Genome Analysis: An Introduction, Springer.

Waterman, M. (2010). Introduction to Computational Biology. Chapman & Hall/CRC Press.

Wunschiers, R. (2009). Computational Biology: Unix/Linux, Data Processing and Programming. New York. Springer-Verlag.

DCIT 412: Computer Vision

This course will cover essentials of computer vision. Students will learn basic principles of image formation, image processing algorithms and different algorithms for 3D reconstruction and recognition from single or multiple images (video). Applications to 3D modelling, video analysis, video surveillance, object recognition and vision based control will be discussed.

Reading List

Ballard, D. H, & Brown, C. M. (2012). Computer Vision. Englewood Cliffs, NJ: Prentice Hall.

Davies, E. R. (2009). Machine Vision (3rd Edition). Theory, Algorithms, Practicalities. Amsterdam: Morgan Kaufmann.

Ponce, J., & Forsyth, D. A. (2011). Computer Vision: A Modern Approach (2nd Edition). Englewood Cliffs, N.J: Prentice Hall.

Verri, A. (2011). Introductory Techniques for 3-D Computer Vision. Upper Saddle River, NJ: Prentice Hall.

Shapiro, L. G., & Stockman, G. C. (2013). Computer Vision. Upper Saddle River, N.J.: Prentice Hall.

DCIT 413: Play and Games

This course shall introduce students to the underlining principles of video games. It will examine the concept of "play" using methods from literary criticism, cultural anthropology, poststructuralism, and cinema studies. The philosophy of action, ludology, and theories of machinic and gamic visuality shall be discussed. Themes will include simulation, social realism, and war games. Topics will include: what is “Play”?, formal criticism, Poststructuralism: Narrative, Authorship and Play, Counter-Gaming: The Politics of Play and artist game mods, Ideology and War, and Gamic Vision.

Reading List

Bertolt, B., Alienation Effects in Chinese Acting. Brecht on Theater, Augusto Boal, Theater of the Oppressed.

Sutton-Smith, B. Play and Ambiguity. The Ambiguity of Play, pp. 1-17.

Carol, C. The Eye of Horror, Viewing Positions: Ways of Seeing Film (Williams Edition).

Shaviro, S. Regimes of Vision: Kathryn Bigelow, Strange Days. Polygraph 13.

Huizinga, J. Nature and Significance of Play as a Cultural Phenomenon," Homo Ludens.

Caillois, R. The Definition of Play" and "The Classification of Games," Man, Play, and Games.

Geertz, C. Deep Play: Notes on the Balinese Cockfight, The Interpretation of Cultures.

Stallabrass, J. Just Gaming: Allegory and Economy in Computer Games.

DCIT 414: Data Mining and Warehousing

This course is an introduction to data mining and motivating challenges, types of data, measures of similarity and distance, data exploration and warehousing, supervised learning, bias and variance. Classification techniques and their evaluation. Clustering, Association and sequence rule mining. The course aims to provide students with viable alternatives for managers rather than replacing judgment with an optimized solution. It also aims to enable students to acquire an understanding of the basic concepts and skills associated with decisionmaking and the modelling of business decisions using data.

Reading
Bharati, P., & Chaudhury, A. (2004). An empirical investigation of decision-making satisfaction in web-based decision support systems. Decision support systems.

Shmueli, G., Patel, N. & Bruc, P. (2005). Data Mining for Business Intelligence.

Hammergren, T. C. (2009). Data Warehousing For Dummies. Hoboken, NJ: For Dummies.

Kimball, R., Ross, M., Thornthwaite, W., Mundy, J., & Becker, B. (2008). The Data Warehouse Lifecycle Toolkit (2nd Edition).

Sauter, V. L. (2011). Decision Support Systems for Business Intelligence. (2nd Edition) Wiley-Blackwell, Chichester.

DCIT 415: Advanced Software Engineering
The course aims to develop the broad understanding of the discipline of software engineering (gained in the earlier Software Engineering course). Additional topics that will be covered include verification and validation, Testing and inspection, Reliability, software evolution, advanced design topics such as system architecture design, object oriented design and functional-oriented design, and finally, Business aspect of software engineering. Although the emphasis will be on modern approaches some more traditional software engineering techniques will also be discussed. The course will also provide an on-going project clinic to directly support a group project work.

Reading List:
Booch, G., Rumbaugh, J. & Jacobson, I. (2015). The Unified Modelling Languages Users Guide (5th Edition). Upper Saddle River, NJ. Addison Wesley Professional.

Braude. E. J., & Bernstein, M. E. (2010). Software Engineering: Modern Approaches. New York: Wiley.

Gomaa, H. (2011). Software Modeling and Design: UML, Use Cases, Patterns, and Software Architectures. Cambridge, UK: Cambridge University Press.

Sommerville, I. (2011). Software Engineering (9th Edition). Addison-Wesley.

Pressman, R, (2010). Software Engineering (7th Edition). Boston, Massachusetts: McGraw Hill.

DCIT 416: Digital Signal Processing
This course provides an introduction to digital signal processing for both undergraduate. In this course, a detailed examination of basic digital signal processing operations including sampling/reconstruction of continuous time signals, Fourier and Z-transforms will be given. The Fourier and Z-transforms will be used to analyze the stability of systems, and to find the system transfer function. The discrete Fourier transform (DFT) and fast Fourier transform

(FFT) will be studied, etc. Further, computer simulation exercises are intended to familiarize the student with implementation aspects and the application of theoretical knowledge to practical problems.

Reading List:

Mitra, S. K., & McGraw-Hill, (2006). Digital Signal Processing: A Computer-Based Approach (3rd Edition).

Proakis, J. G., & Dimitris G. Manolakis, D. G. (2007). Digital Signal Processing Principles, Algorithms, and Applications (4th Edition). Prentice- Hall.

Ingle and Proakis, (2006). Digital Signal Processing using Matlab (2nd Edition). ThomsonEngineering.

Richard G. Lyons, R. G. (1996). Understanding Digital Signal Processing. Prentice Hall,

Smith, S. W. (1997). The Scientist and Engineer's and Guide to Digital Signal Processing, California. Technical Publishing.

DCIT 417: Network Performance Analysis and Modeling

This course aims to develop an understanding of the tools and technologies for understanding and improving the performance of communication networks such as the Internet. It will introduce students to quantitative methods for loss and delay analysis in packet networks, using techniques from stochastic traffic modelling, Markov chains, and queueing theory. It will expose students to frameworks for optimization and orchestration of network performance, including emerging paradigms such as SDN. The quantitative methods studied in this course will be applied to practical examples from network architecture and design, in different network domains.

Reading List

Chapman, C. (2016). Network performance and security: testing and analyzing using open source and low-cost tools. Publisher: Elsevier Ltd, Syngress.

Kakadia, D. (2017). Network performance and fault analytics for wireless service providers. Publisher: springer, India, private,

German R. (2000). Performance Analysis of Communication Systems: Modeling with NonMarkovian Stochastic Petri Nets (1st Edition). Wiley Publishing.

Stênio, F. (2017). Performance Evaluation for Network Services, Systems and Protocols (1st Edition). Springer International Publishing.

Yang, Y., Jing, X., Guang, S. & Cheng-Xiang W. (2017). 5G Wireless Systems: Simulation and Evaluation Techniques (Wireless Networks) (1st Edition). Springer publishing.

DCIT 418: Systems and Network Security

This course provides a comprehensive study of security principles and practices in computer and network systems. Topics include computer security concepts, attack techniques, security policies, basic cryptographic tools, authentication, access control, network intrusion detection, software security, operating system security, network security, legal and ethical issues in computer security. Combined with the experiences that they obtain from the course projects, students would improve their skills of developing secured network applications and systems that detect and defend against malicious attacks. Students will be prepared to evaluate the security of real network systems, and to develop strategies to detect and defend against attacks.

Reading List:

Charles, P., & Shari, L. P. (2003). Security in Computing (3rd Edition). Prentice Hall,

Bishop, M. (2003). Computer Security: Art and Science. Addison-Wesley

Easttom, C. (2011). Computer Security Fundamentals (2nd Edition). Indianapolis: Que.

Kaufman, C., Perlman, R., & Speciner, M. (2014). Network Security, Private Communication in a Public World (2nd Edition). Englewood Cliffs, N.J.: Prentice Hall.

Stewart, J. M. (2011). CompTIA Security+ Review Guide (2nd Edition). Wiley Publishing.

DCIT 419: Agile Methods

This course will address what agile methods are, how they are implemented and their impact on software engineering. A variety of agile methods will be described, but the focus will be on Scrum and Extreme Programming. Issues associated with planning and controlling agile projects, along with the implications of empowered teams on the customer-supplier dynamic, will give a fuller picture of how the agile practices are realized. Assignments and projects are designed to help students apply agile principles and practices in their own professional context. Additional subthemes include enterprise agility, team dynamics, collaboration, software quality, and metrics for reporting progress.

Reading List:

Larman, C. (2004). Agile and Iterative Development: A Manager's Guide.

Schwaber, K. (2004). Agile Project Management using Scrum. Microsoft Press.

Schwaber, K. & Beedle, M. (2002). Agile Software Development with Scrum.

Poppendieck, M., & Poppendieck, T. (2003). Lean Software Development: An Agile Toolkit. Addison Wesley

Sahota, M. (2012). An Agile Adoption and Transformation Survival Guide. InfoQ

DCIT 421: Persuasive Systems and Design

In this course students will be introduced to the philosophy underpinning human computer persuasion. They will explore latest research results, best practices and guidelines for the use of persuasive applications. Student teams will work on real-world projects in which they will design and implement persuasive technology applications. In addition, the course will host several expert guest speakers from industry and higher education institutions who will share their latest findings. Topics include, persuasive technologies, modeling human attitude behavior change, persuasive system features, technology, design perspectives, methods for designing persuasive systems, ethical issues and unexpected effects of persuasive technologies and disruptive technologies.

Reading List

Fogg, B.J. (2002). Persuasive Technology: Using Computers to Change What We Think and Do (Interactive Technologies).

Booch, G., Rumbaugh, J. & Jacobson, I. (2005). The Unified Modeling Language Users Guide (2nd Edition). Upper Saddle River, NJ: Addison-Wesley Professional.

Oinas-Kukkonen, H., & Harjumaa, M. (2009). Persuasive systems design: Key issues, process model and system features in Communications of the Association for Information System.s 24 (1)

Orji, R., Vassileva, J., & Mandryk, R. L. Modeling the efficacy of persuasive strategies for different gamer types in serious games for health in User Modeling and User-Adapted Interaction. 24 (5)

Wiafe, I., Nakata, K., & Gulliver, S. (2014). Categorizing users in behavior change support systems based on cognitive dissonance, in Personal and Ubiquitous Computing. vol: 18 (7)

DCIT 422: Information Visualization

This course will study the principles of computer graphics and interactive graphical methods for problem solving. Emphasis placed on both development and use of graphical tools for various display devices. Several classes of graphics hardware considered in detail. Topics include pen plotting, storage tubes, refresh, dynamic techniques, three dimensions, color, modeling of geometry, and hidden surface removal. Part of the laboratory involves use of an interactive minicomputer graphics system. Introduces the fundamentals of three-dimensional computer graphics: rendering, modeling, and animation. Students learn how to represent three-dimensional objects (modeling) and the movement of those objects over time (animation).

Reading List

Bouweraerts, D. (2004). Introduction to Computer Graphics - Design Professional. Boston, Mass.: Course Technology.

Bungartz, H., Griebel, M., & Zenger, C. (2004). Introduction To Computer Graphics. London: Charles River Media.

Foley, J. D., Dam, A. V., Feiner, S. K., Hughhes, J. F., & Phillips, R. L. (2011). Introduction to Computer Graphics. Reading, Mass.: Addison-Wesley Professional.
Shirley, P., Ashikhmin, M., & Marshner, S. (2009). Fundamentals of Computer Graphics. Wellesley, Mass.: A K Peters.

Vince, J. A. (2010). Introduction to the Mathematics for Computer Graphics. Berlin: Springer.

DCIT 423: Network Servers and Infrastructure

Covers IP networking concepts and practices for using DHCP, DNS, secure communication, routing, remote address services, web servers, and network connectivity between operating systems. Students learn TCP/IP, routing architecture, and understand application-level services used in Internet. Through networking lab sessions, students focus on using switches and routers connected in LANs and WANs.

Reading List

Burgess, M. (2014). Principles of Network and System Administration (2nd Edition). New York: Wiley.

Hunt, C. (2002). TCP/IP Network Administration (3rd Edition; O'Reilly Networking). Sebastopol, CA: O'Reilly & Associates,

Iniewski, K., McCrosky, C. & Minoli, D. (2008). Network Infrastructure and Architecture: Designing High-Availability Networks (1st Edition). Hoboken, NJ: Wiley-Interscience.

Kurose, J. F. & Ross, K. W. (2009). Computer Networking: A Top-Down Approach (5th Edition). Boston, MA: Addison-Wesley,

Limoncelli, T. A., Hogan, C. J. & Chalup, S. R. (2007). The Practice of System and Network Administration (2nd Edition), Upper Saddle River, NJ: Addison-Wesley.

DCIT 424: Entertainment Software Development

Education is experiencing innovation with various new technologies incorporated into classrooms. Technology incorporated edutainment plays as a motivator or facilitator in learning. In this course students will be introduced to how educational content can be deliberately incorporated into digital entertainment such as digital games, cartoons, etc. The course will provide an overview of the new generation's traits, locating and searching for instructional elements in cartoons, TV programs, movies, and digital games. New emerging forms of edutainment for on mobile devices shall also be discussed. Student shall be given projects to develop applications that combines learning and fun.

Reading List

Booch, G., Rumbaugh, J. & Jacobson, I. (2005). The Unified Modeling Language Users Guide (2nd Edition). Upper Saddle River, NJ: Addison-Wesley Professional.

Charsky, D. From Edutainment to Serious Games: A Change in the Use of Game Characteristics in Games and Culture Vol 5.

Calvo-Ferrer, J. R. (2017). Educational games as stand-alone learning tools and their motivational effect on L2 vocabulary acquisition and perceived learning gains, British Journal of Educational Technology.

Minhua, Ma. & Oikonomou, A. (2011). Serious Games and Edutainment Applications.

Egenfeldt-Nielsen, S. (2011). Beyond Edutainment: Exploring the Educational Potential of Computer Games.

DCIT 426: Telecommunication Systems

This course focuses on Third generation mobile systems: WCDMA concepts, Multi-User Detection, Antenna Array techniques, MIMO, high speed packet access, long term evolution, radio resource management, packet scheduling, core network evolution. Multimedia: Image and video representation and transmission. Competing technologies: WiFi, WiMAX, FttX. Emerging techniques: may include MANET, cognitive radio. At the end of this course, students will be able to: Demonstrate a broad understanding of Third generation mobile systems, Multimedia representation and the interaction with telecommunications protocols, Other contemporary and emerging wide area data technologies, Emerging research areas in telecommunications, and the interaction between commercial interests and technology standards.

Reading List

Dover, T. (2014). Introduction to Telecommunications: Analog Voice and Data System. DTS Inc.

Freeman, R. (2014). Telecommunication System Engineering (4th Edition). Wiley.

Freeman, R. (2007). Radio System Design for Telecommunication (3rd Edition).

Lathi, B. P. (2004). Linear Systems and Signals (2nd Edition).

Lindsey, W. C., & Simon, M. K. (2011). Telecommunication System Engineering.

DCIT 428: Wireless Systems & Networks

This course covers fundamental principles underlying wireless data communications. Topics include wireless transmission basics, radio propagation issues, antennas, digital modulation, spread spectrum techniques and their applications, and popular standards: WiFi, WiMAX and Bluetooth. Also presents practical knowledge to enable the design, testing, deployment,

debugging and commissioning of WiFi, WiMAX networks and point-to-point microwave systems. Discussions on cellular network technologies are also included.

Reading List

Freeman, R. (2014). Telecommunication System Engineering (4th Edition). Wiley.

Gast, M. (2015). 802.11 Wireless Networks: The Definitive Guide (2nd Edition). Beijing: O'Reilly Media.

Rappaport, T. S. (2012). Wireless Communications: Principles and Practice (2nd Edition). Upper Saddle River, NJ: Prentice Hall.