



BITS College

School of Systems and Technology

**Curriculum of Undergraduate Program
in
*Information Technology and Systems***

*Revised
January 2021
Addis Ababa, Ethiopia*

Program Summary

Name of the Degree Program:	B.Sc. in Information Technology and Systems
Standard Period of Study:	4 Academic Years With 8 Semesters
Commencement of the Program:	2013 E.C. / 2020/21 G.C

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1. Introduction

1.1 BITS College

BITS College is a private higher learning institution with a vision of promoting excellence in the production, growth and dissemination of advanced scientific knowledge through teaching and research. The College is conceived, established and run by caring and committed educators and innovators who seek to improve the quality of higher education in the country through the introduction of innovative and enlightened education programs that help students realize their potential. It aims at realizing this by engaging a management team experienced in education and business, a dedicated team of faculty and staff, well-designed academic programs, world class educational facilities and cutting-edge technologies. The senior management team comes with over 30 years' combined experience in teaching at tertiary level (at Addis Ababa University (AAU)), holding senior management positions at AAU (education management), unique and proven track record in corporate management in technology (IT service) industries.

Amongst the founders of the College is a focused and well-reputed system development and training company, with proven track record in business process management and enterprise software development and support. Founded in 2012, the IT Company mainly involves in the design and development of innovative and high-quality web-based business applications for the logistics, construction, and health sectors. In fact, BITS had its genesis in this IT Company.

BITS plans to engage in mutually rewarding collaborations and strategic partnerships with national, international, public, and private higher learning and research institutions so as to grow and become a full-fledged university that offers undergraduate and graduate degree programs in business and technology related fields.

Currently, the School of Systems and Technology is established under the College to offer four academic programs, namely:

- Bachelor of Science Degree in Information Technology and Systems
- Bachelor of Science Degree in Software Engineering
- Master of Science Degree in Enterprise Systems Engineering
- Master of Science Degree in Information Technology Management

The main purpose of this document is to present the required narratives to establish the undergraduate program in Information Technology and Systems. Accordingly, the document is organized as follows. The remaining part of this section presents the rationale for the undergraduate program in Information Technology and Systems. The second section of the document presents the curriculum. The third section details the resource requirements of the program. Section four presents the course offering schedule both for the regular and extension programs.

1.2 Rationale

ICT has taken the centre stage in almost every aspect of human endeavour. It helps improve the efficiency and effectiveness of services offered to customers and enhance business processes, managerial decision making, and workgroup collaborations, which strengthens competitive positions in rapidly changing and emerging economies. With the huge investment in business industries such as Banking and Telecom, there is a greater demand for an ICT workforce of world standard. Specializations in various technical knowledge such as service management, governance, IT Audit and cyber security are in demand. Furthermore, with the increasing competition and customer demand, business organizations are required to allocate greater resources into ICT governance and security infrastructure. This in turn requires highly skilled technical personnel well equipped to manage ICT investments in large business and financial companies. As such, both the software and business industries expect students to be educated in courses and projects that are professionally relevant and that prepare them well for the work place.

Needless to say, that the county's future lies in educating its people to the highest possible standards. In order for the country to reach its economic and social goals, a thriving and successful higher education system is essential. The increasing enrolment and graduates in recent years also indicate the commitment in this country to further expand and modernize tertiary level education - to provide greater opportunities for all citizens. A college degree is becoming the preferred currency of the job application processes more and more, as such, those without degrees are being given less and less preference by employers.

Currently, there are more than 53 public and private higher learning institutions. Almost all of these higher learning institutions have one or more IT related undergraduate programs. Despite such encouraging developments of increasing the number of Colleges, programs and college degree holders, much serious concerns are being expressed with regard to the quality of graduates.

- There is widespread dissatisfaction among both graduates and their employers on the performances of the graduates in the work area.
- The enrolled and graduates feel not necessarily better educated in employable skills, problem solving skills, critical thinking skills, etc.
- Employers feel that current graduates are deficient in thinking and problem-solving skills and hence inadequate for the demands of the workplace.
- In the case of IT graduates, for instance, graduates lack the ability to link technology and information systems with business processes and strategic objectives of organizations.
- There is a growing awareness among employers that graduates entering the workforce with such deficiencies would have a great repercussion on the ability to be competitive in a global marketplace.

Taking cognizance of this, as of recent, the need to introduce initiatives to improve/increase the quality of education is being advocated widely. Deliberations are underway at various forums on the whys and wherefores of the deficiencies. Among the issues under consideration are: revisiting college entrance preparations and exams; exploring ways and means of considering employable skills in the design and delivery of curricula; redesigning the national education roadmap, et cetera.

To this end, in the wake of the numerous challenges facing education in the country, and motivated by some of the national initiatives in this connection, BITS College is established to make its share of contribution to the on-going efforts of quality improvement. We seize this chance to address the challenge of providing education that meets high quality standards and whose contents are aligned to the needs of the country's economy and society.

The proposed undergraduate program in **Information Technology and Systems** is a step in this direction.

2. Bachelor of Science in Information Technology and Systems

2.1 Program Objective

The Bachelor of Science in Information Technology and Systems (BSc. ITS) intends to produce a competent graduate who is a collaborative problem solver, skilled practitioner, or applied research investigator who enjoys getting technology to work effectively and meet user needs in a variety of settings. The program prepares graduates that would work collaboratively to integrate new technologies in the workplace and community and ensure a superior and productive experience for the user and all the organization's functions. In the corporate environment, graduates of this program would apply their understandings of system integration, development, and operation, and deploy and manage IT services and platforms that meet the business goals and objectives of the organization. In the community, ITS graduates use their expertise in implementing a wide range of IT solutions to support community members' projects and activities. ITS graduates are professionals prepared to perform duties in an ethical manner. ITS graduates can explain and justify professional decisions in a language that both management and clients understand. They are aware of the budget implications of technological alternatives and can defend budgets properly. ITS graduates have extensive practice with properly securing IT networks, applications, data centres, and online services. Generally, the program prepares graduates for careers across all industries and settings that demand the competencies stated above and, specifically, as IT managers, network administrators, network architect, database designers, database administrators, system administrators, information security analysts, systems analysts, to mention a few.

2.2 Graduate Profile

Graduates of the ITS program acquire knowledge, skill, and disposition that would make them collaborative IT-based problem solvers, skilled IT practitioners, or applied research investigators that are valuable to current and future employers. After obtaining the degree in Information Technology and Systems, graduates will have the following profiles

- (i) Knowledge and understanding of:
 - theories, practices and principles of information technology
 - computers and communication systems, including network design, database development, implementation and management;
 - principles and best practices of IT project management
 - issues affecting the industry and its technologies.
 - creating, maintaining, auditing and improving systems to meet particular needs,

(ii) Practical Skills:

- Analyze complex, real-world problems to identify and define computing requirements and apply computational approaches to the problem-solving process.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the IT discipline.
- Communicate effectively with diverse audiences the technical information that is consistent with the intended audience and purpose.
- Make informed judgments and include unique perspectives of others in computing practice based on legal and ethical principles.
- Function effectively on teams and employ self- and peer-advocacy to address bias in interactions, establish goals, plan tasks, meet deadlines, manage risk, and produce deliverables.
- Identify and analyze user needs and consider them during the selection, integration, and administration of computer-based systems.

(iii) Attitudes and Values:

- make contributions to the further development of the discipline
- have a positive and responsive attitude towards the value of their profession in general and secure IT system infrastructure and resources in particular.
- have good personal confidence in their jobs and professional activities;
- have the sense of cooperation, honesty, loyalty, etc.
- work closely with other staff, such as project managers, graphic artists, UX designers, other developers, systems analysts and sales and marketing professionals
- be ethical.

2.3 Admission Requirements

Ethiopian Students

To be eligible for admission to BITS College, applicants should meet one of the following requirements.

- (i) A graduate of an accredited high school with the required pass mark set by the national examination agency to enter higher education **AND** the necessary pass mark in the College's Entrance Examination.
OR
- (ii) A TVET Graduate approved for entry to higher education with official COC **AND** the necessary pass mark in the College's Entrance Examination
OR
- (iii) A graduate of an accredited higher education **AND** the necessary pass mark in the College's Entrance Examination

Foreign Students

- Admission of foreign students is based on the equivalence established by the Ministry/Higher Education Relevance and Quality Assurance Agency.

2.4 Structure of the Program

The program has 33 core courses, 3 electives and 11 support courses that are designed to be completed within 4 years of study. There are a total of 8 semesters (i.e. two per academic year) and each semester has 16 weeks.

2.5 Duration of Study

The duration of study for undergraduate degree regular program in Information Technology and Systems is four years. In the case of evening programs, the duration of study shall be five to six years.

A student who withdraws for valid reasons shall be granted readmission within six years after the date of withdrawal and failure to apply for readmission within this period of time shall entail dismissal for good.

2.6 Assessment and Evaluation

Examination is the main component of the evaluation methods. Final examination (50%), continuous assessment (50%) is favoured for almost all the courses together with other methods stated in each course.

The traditional assessment methods, paper exam, will be used in most of the courses. Whenever applicable the following assessment methods might also be used.

- Peer Assessment
- Progress Assessment by advisors for Projects
- Presentation for course-based projects and senior project
- Laboratory practical test

Whenever the practical part of a course is crucial for declaring competency of a course, the students should score a satisfactory result in the practical assessment of the course. The student shall fail the course if he/she fails to meet the minimum threshold of the practical assessment.

Details are also given under each course.

2.7 Course Exemption

A student may be exempted from a core course based on previous study provided that he/she passes the exam set by the College for the specific course. An exemption from a course has no credit value towards a degree. Any such courses may be replaced with courses chosen in consultation with advisors.

Exemptions from support courses may be granted in cases where students have already covered the work at any accredited higher learning institution with an appropriate level of performance (with a minimum grade of B-). Any such courses may be replaced with courses chosen in consultation with advisors.

Students who opt not to replace the courses they are exempted for, would be granted exemption for up to 20% of the courses provided in their respective program of study.

2.8 Grading System

Examinations are graded on the following letter grading system, with corresponding points.

Raw Mark ¹	Letter Grade	Grade Points	Description	Class Description
[95, 100)	A+	4.00	Excellent, Exceptional	First Class with Great Distinction
[85, 95)	A	4.00	Excellent - Outstanding Performance	
[80, 85)	A-	3.70	Excellent	
[75., 80)	B+	3.50	Very Good – Better than Average Achievement	First Class with Distinction
[65, 75)	B	3.00	Very good	
[60, 65)	B-	2.70.	Very Good – less than average achievement	First Class
[55, 60)	C+	2.50	Good Achievement	Second Class
[50, 55)	C	2.00	Average Achievement	Second Class
[40, 45)	D	1.00	Fail	Lower Class
< 40	F	0.00	Fail	Lower Class
	AU	Neutral	Successfully audited a course – no grade is assigned	
	CO	Neutral	Course continued in the following semester and grade assigned at that time – not included in grade – point average calculation.	
	W	Neutral	Withdrawn: Student has withdrawn from the course – no academic penalties	
	DO	Neutral	Drop Out: A student has not withdrawn from a program in accordance with the withdrawal procedures set forth by the College or has not produced evidence justifying his failure to sit for the examination	
	NG	Neutral	No Grade for some reason – This grade will be changed to F unless an appropriate reason comes or grade given in 6 weeks time.	
	I	Neutral	The student has not yet completed all requirements to receive a grade. The instructor has to write the reason why the grade of I is given. This grade will be changed to F unless an appropriate reason comes or grade given in 6 weeks time.	

¹ The square bracket - [- indicates that the number is included in the respective range ; The open bracket -) - indicates the number is excluded in the respective range.

2.9 Assignment of Course Codes

The course code has two alphabets and three-digit numbers like IT105. The two alphabets code indicates the name of the program with all capital letters. For instance, **IT** indicates abbreviation of the program of Information Technology and Systems.

The course codes are made in the following format:

- IT XXX, where:
 - “IT” represents the short form of the program name for courses in the undergraduate program in Information Technology and Systems
 - “SE” represents the short form of the program name for courses in software engineering
 - “SP” represents the short form for support courses
 - “MT” represents the short form for mathematics courses
 - ‘XXX’ represents a 3-digit numeric part of the course code with the following convention:
 - The first digit indicates the level of the course in terms of the year (‘1’ for 1st year, ‘2’ for 2nd year, ‘3’ for 3rd year and ‘4’ for 4th year courses);
 - The Second digit indicates level and similarity of the courses in the program (0 designates foundation courses, 1 for support courses; 2 designates systems requirements and software related courses; 3 designates programming courses; 4 designates database related courses; 5 designates computer and network related courses; 6 designates mathematics, statistics and AI related courses; 7 designates management courses; 8 designates web related courses; and 9 represents industrial capstone projects.
 - The third digit indicates the semester within which the course is offered (odd numbers are given for courses given in the first semester and even numbers are given for courses given in the second semester)

For instance, IT247 means a database related course given for second year students in the 1st semester)

2.10 Medium of Instruction

The medium of instruction for the program is ENGLISH

2.11 Graduation Requirements

2.11.1 Course Requirements

The overall student’s workload in Credit hours is 140 with 18 credit hours per semester on the average (This means 236 European Credit Accumulation Transfer System (ECTS) with 30 ECTS/Semester on the average).

(i) Compulsory Courses (101 Cr. Hrs. – 169 ECTS)

Students must take and pass all of the following compulsory courses to graduate from the program.

Course Code	Course Title	Prerequisite	Cr. hours	ECTS
IT105	Introduction to ICT	None	3	5
IT107	Foundations of Information Systems	None	3	5
SE131	Fundamentals of Programming	None	3	5
IT154	Data Communications and Computer Networks I	None	3	5
IT155	Data Communications and Computer Networks II	IT154	3	5
IT146	Database Systems I	IT107	3	5
IT221	Systems Analysis and Design I	IT107	3	5
SE132	Object Oriented Programming	SE131	3	5
IT222	Systems Analysis and Design II	IT221	3	5
IT247	Database Systems II	IT146	3	5
SE252	Operating Systems	None	3	5
IT284	Introduction to Web Technologies	IT146, IT154	3	5
IT325	Software Design & Construction	SE132	3	5
SE381	Web Systems and Services	None	3	5
SE327	Enterprise Systems	None	3	5
IT328	IT Systems Acquisition and integration	SE327	3	5
IT358	Cyber Security and Ethical Hacking	SE381	3	5
SE366	Methods for IS Research	MT361	3	5
IT374	IT needs assessment and management	SE327	3	5
SE421	Systems Thinking & Systems Approach	SE327	3	5
IT471	IT Project management	SE327	3	5
SE422	Information Assurance and Systems Security	IT358	3	5
IT463	Foundations of Data Analytics	MT361	3	5
IT474	Special Topics in IT	None	3	5
IT476	IT Service Management	SE421	3	5
IT481	Cloud Computing and Data Centre Management	IT381	3	5
IT493	IT Capstone Project I	None	4	7
IT494	IT Capstone Project II	IT493	4	7
MT161	Discrete Mathematics	None	3	5
MT164	Linear Algebra	MT161	3	5
MT261	Calculus	MT161	3	5
MT266	Boolean Algebra	MT164	3	5
MT361	Statistical Methods	None	3	5
Total Credit			101	169

(ii) Elective Courses (9 Cr. Hrs. – 15 ECTS)

Students must take and pass a minimum of 9 credit hours (15 ECTS) of courses from the following list.

Course Code	Course Title	Prerequisite	Credit hours	ECTS
SE231	Advanced Programming	SE132	3	5
IT365	Introduction to Artificial Intelligence	None	3	5
IT368	Knowledge Discovery and Data Mining	None	3	5
IT372	Fundamentals of Disaster Recovery and Business Continuity	None	3	5
IT475	Information Systems Governance and Audit	None	3	5
IT477	IT Policy and Law	None	3	5
IT479	Management Information Systems	IT107	3	5

(iii) Support Courses (30 Cr. Hrs. – 52 ECTS)

Students must take and pass all of the following support courses (30 Cr. Hrs. - 52 ECTS) to graduate from the program.

Course Code	Course Title	Prerequisite	Credit hours	ECTS
SP111	College English I	None	3	5
SP112	College English II	SP111	3	5
SP115	Geography of Ethiopia and the Horn	None	3	5
SP117	Introduction to Logic and Critical Thinking	None	3	5
SP116	History of Ethiopia and the Horn	None	3	5
SP211	Social Anthropology	None	2	4
SP214	General Psychology	None	3	5
SP216	Moral and Civic Education	None	2	4
SP311	Business Accounting & Management	None	3	5
SP312	Entrepreneurship	None	3	5
SP411	Inclusiveness	None	2	4
Total Credit			30	52

2.11.2 Grade Requirements

To graduate from the program, students must pass every compulsory course, and at least 9 credit hours of elective courses with a Cumulative Grade Point Average (CGPA) of at least 2.0. A pass grade for a course is considered to be A, B+, B, C+, C or C-.

A student cannot graduate with a CGPA of less than 2.0. He shall thus score at least a `C` grade in each of the courses he is required to take under the program. However, a good standing student is entitled to graduate even if he scores a `D` grade in any course.

2.11.3 Internships

As one of the critical components to enable a professional level work experience prior to graduation, a student is expected to work in a company in one of the three summer vacations during his/her stay at the College. At the end of the internship, the student is required to write a short summary of the experience gained. The paper should address the overall impression of the field in which the internship occurred, new skills acquired, contact made and how this experience may be helpful in the intern's future plans for graduate study or future employment.

Internship is a compulsory non-credit work and shall be recorded with a grade of "P" (Pass) and "F" (Fail), but neither shall be included in the computation of the Grade Point Average (GPA).

2.11.4 Community Service

In accordance with the community service guideline provided by the College, students are required to complete a minimum of 24 hours of community service in the course of their study.

The College shall provide a certificate of appreciation for the community service carried out by a student.

2.12 Degree Award

The degree awarded on successful completion of the undergraduate program is
"Bachelor of Science Degree in Information Technology and Systems"

2.13 Degree Nomenclature

English:

"Bachelor of Science Degree in Information Technology and Systems"

Amharic:

“የሳይንስ ባችለር ዲግሪ በ “ኢንፎርሜሽን ቴክኖሎጂ እና ሲስተምስ”

2.14 Quality Assurance

The College shall ensure the quality of its undergraduate programs so as to achieve the objectives set for them and respond to the needs of students and society. Among the major activities to be carried out are:

- attracting qualified and committed staff;
- maintaining curricula that meet national and international standards;
- maintaining standard class sizes that allows close follow-up and individualized service
- Standardization of course offerings through preparation of general course outlines, exam contents, and external audit;
- the actual provision of opportunities for students to take what has been learnt in classroom and transform it into uses in the real world;
- use of state-of-the-art laboratories, computing facilities, and educational support materials;
- Periodical workshops (with stakeholders, teachers and graduates);
- Summative review of the program every four years
- Graduates' evaluation of the program;
- Assessments using survey project works/research, internships, and link programs;
- Annual assessment of the program;
- Establishing Alumni of Graduates as a mechanism to assess their career development.

3. Course Descriptions

3.1 Core/Compulsory Courses

3.1.1 IT105 Introduction to ICT

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester I	
Description:	The purpose of the course is to create a foundational understanding of the relevance of ICT which will inspire the student to pursue more detailed studies. It explores the context of computing, conflicts and social changes brought about by ICT. Topics include: an overview of computer and Information Systems (IS), development of computers, data representation, logical organization of a computer system, computer software, computer arithmetic, computer system architecture, internet, computer network and communication, problem solving using computers, operating systems, windows environment and office application and ethics (ethical theories and how they are applied in information and computer related issues).	
Learning Outcomes:	<p>After completing this course, Students will be able to:</p> <ul style="list-style-type: none"> ● Understand different terms associated with ICT ● Identify various components of a computer system ● Identify the various categories of software and their usage ● Define the basic terms associated with communications and networking ● Understand different terms associated with the Internet and World Wide Web. ● Use various web tools including Web Browsers, E-mail clients and search utilities. ● Use text processing, spread sheets and presentation tools ● Understand the enabling/pervasive features of ICT ● Explain ethical issues in ICT 	
Course Content		
Unit	Topic	Week
1	<p>Modern Computer Systems Architecture:</p> <ul style="list-style-type: none"> ● Introduction to computer systems <ul style="list-style-type: none"> ○ Computer Hardware ○ Computer Software ○ Liveware ● Computer Architecture <ul style="list-style-type: none"> ○ Instruction Set Architecture ○ Micro architecture ○ System Design ● Von Neumann Architecture ● Computer Organization ● Computer Architecture Design Goals 	1-2
2	<p>Data Representation in Computers:</p> <ul style="list-style-type: none"> ● Concepts of Data Representation in Digital Computers <ul style="list-style-type: none"> ○ Binary Systems : Bits, Bytes, Nibble and Word 	3-5

	<ul style="list-style-type: none"> • Types of Data Representation <ul style="list-style-type: none"> ◦ Number Systems and Their Representation • Binary Number System • The Hexadecimal System 	
3	Logic Gates and Logic Circuits: <ul style="list-style-type: none"> • Logic Gates • Functions of Logic Gates • Logic Circuits 	6-7
Mid Semester Week		8
4	Operating Systems: <ul style="list-style-type: none"> • Introduction to Operating Systems • Processes and Threads <ul style="list-style-type: none"> ◦ Process synchronization ◦ Process Scheduling • Main Memory Management • Virtual Memory • File Systems 	9-11
5	Programs and Programming Languages: <ul style="list-style-type: none"> • Introduction to Programs • Computer Program Design • Introduction to Programming Languages <ul style="list-style-type: none"> ◦ Levels of Programming Language • Procedural Language • Introduction to programming in C • Introduction to programming in Assembly Language • Program Execution <ul style="list-style-type: none"> ◦ Interpreter ◦ Compilers 	12-14
Textbook:	Information Technology Essentials: An Introduction to Information Technology 2017 by Eric Frick	
References:	Introduction to Computers and Information Technology (2nd Edition), 2015 by Emergent Learning There will also be supplemental readings beyond the References / Textbook, such as articles or web pages, which will be assigned throughout the semester.	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.2 IT107 Foundations of Information Systems

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester I	
Description:	This course intends to introduce concepts of Information, Social Impacts of information and computers. Major topics covered include the role and use of information systems – people, software, hardware, data and communication technologies. Students will gain an understanding of how information is used in organizations and how IT enables improvement in quality, speed, and agility. This course also provides an introduction to systems and development concepts, technology acquisition, and various types of application software that have become prevalent or are emerging in modern organizations and society.	
Learning Outcomes:	<p>After completing this course, Students will be able to:</p> <ul style="list-style-type: none"> ● Understand how and why information systems are used today. ● Explain the technology, people, and organizational components of information systems. ● Understand how businesses are using information systems for competitive advantage vs. competitive necessity. ● Understand the value of information systems investments as well as learn to formulate a business case for a new information system, including estimation of both costs and benefits. ● Know the major components of an information systems infrastructure. ● Mitigate risks as well as plan for and recover from disasters. ● Understand how information systems are enabling new forms of commerce between individuals, organizations, and governments. ● Be aware of emerging technologies that enable new forms of communication, collaboration, and partnering. 	
Course Content		
Unit	Topic	Week
1	Basic concepts of Information Systems <ul style="list-style-type: none"> ● Definition and components of Information Systems ● Roles of IS in Organizations ● Types of information systems (Financial and Asset management information systems, Human capital management, ERP Systems etc.) ● IS Strategy Development ● Systems thinking 	1 - 2
2	The IT infrastructure: <ul style="list-style-type: none"> ● Hardware Components ● Software Components ● Networks, the Internet and Cloud computing ● Evolution of the IT infrastructure ● Enterprise Architecture 	3 - 4
3	Business Intelligence and Decision Making: <ul style="list-style-type: none"> ● Databases and data warehousing ● Business Intelligence definition ● Data mining and analytics ● Web analytics as a resource for business intelligence 	5-7

	<ul style="list-style-type: none"> • Issues in information resources management 	
Mid Semester Week		8
4	Web, E-Commerce and Mobile Commerce <ul style="list-style-type: none"> • Building websites • E-commerce • Mobile Devices and Mobile Commerce 	9
5	Information Systems Development: <ul style="list-style-type: none"> • Overview of Information systems development • Systems development Life Cycle • Human Elements in Systems Development • Procuring information systems • Project management and strategic planning 	10-11
6	Collaborating with Technology <ul style="list-style-type: none"> • Social Networking and its implications • Knowledge management and eLearning 	12
7	Information Systems Ethics, Security and Privacy <ul style="list-style-type: none"> • Information systems vulnerabilities (intellectual property and plagiarism, theft, fraud, etc.) • Tools and technologies for information privacy • Organizational policies and procedures 	13-14
Textbook:	Introduction to Information Systems: People, Technology and Processes (3rd Edition), 2017 by Patricia Wallace	
References:	Introduction to Information Systems , 2012 by George Marakas and James A. O'Brien Introduction to Information Systems, 7th Edition, 2017 by R. Kelly Rainer and Brad Prince Introduction to Information Systems: Supporting and Transforming Business, 2013, R. Kelly Rainer and Brad Prince There will also be supplemental readings beyond the References Textbook, such as articles or web pages, which will be assigned by the instructor throughout the semester.	
Teaching Strategy:	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.3 SE131 Fundamentals of Programming

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester II	
Description:	<p>In this course the student will gain a broad understanding of modern computer programming. The student will acquire introductory skills in problem analysis, solution design, and program construction. Through practical programming activities, the student will gain an appreciation of the nature and history of computer programming. Introduction to computer programming. The main contents of the course are - Generations of computer language; Interpreted and compiled languages; Program design and development process; Problem definition; Pseudo-code; Flowcharting; Code modularization; Coding, testing, and debugging; Sequence, selection, and iteration patterns; Array processing; File operating, file input / output.</p>	
Learning Outcomes:	<p>Upon successful completion of this course, the student will have reliably demonstrated the ability to:</p> <ul style="list-style-type: none"> • Demonstrate problem solving skills by developing algorithms to solve problems incorporating the concept of data abstraction in a computer program. • Use pseudo-code and visual modelling to prepare clear and accurate program documentation and models. • Examine working programs to identify their structures. • Design programs according to specifications by creating flow charts, IPO charts and pseudo code. • Implement a simple program by writing the code, testing the code and debugging the program. • Incorporate the use of sequential, selection and repetition control structures into a program. • Demonstrate an understanding of the design and implementation of functions and the passing of parameters to simplify the solution of large problems and to promote the concept of code reuse. • Implement programs using sequential input and output files. • Demonstrate an understanding of the use of the array data structure 	
Course Content		
Unit	Topic	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> • The python programming language • Installing Python • Programming language and types • Writing first python program • Syntax and data types • Variables • Operators <ul style="list-style-type: none"> ○ Arithmetic operators ○ Logical operators ○ Unary operators 	1-2
2	<p>Decision (branching)</p> <ul style="list-style-type: none"> • Introduction to conditional statements <ul style="list-style-type: none"> ○ Simple If ○ if ... else ... 	3-4

	<ul style="list-style-type: none"> ○ if ... else if ... else ... ○ switch 	
3	Repetitive Tasks <ul style="list-style-type: none"> ● Introduction to looping statements and flow control ● For loop ● While loop ● do...while loop 	5-6
4	Functions <ul style="list-style-type: none"> ● Why functions? ● Passing arguments and returning value ● Keyword arguments ● Variable scope ● Default values ● Main function ● Recursive function 	7
Mid Semester Week		8
5	Data structures <ul style="list-style-type: none"> ● List ● Tuple ● Dictionary ● Sets 	9-11
6	File operations <ul style="list-style-type: none"> ● Opening a file ● Reading from file ● Writing to file ● Closing a file 	12-14
Textbook:	Python Crash Course: A Hands-On, Project-Based Introduction to Programming, 2015, by Eric Matthes	
References:	Learning Python, 5th Edition, 2013, by Mark Lutz Python Programming: An Introduction to Computer Science, 3rd Ed, 2016, by John Zelle https://www.python.org/about/gettingstarted/	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.4 IT154 Data Communications and Computer Networks I

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester II	
Description:	The course aims at exploring the various types of data communication systems, networks and their applications. The content includes: computer networks, seven-layer architecture, OSI & TCP/IP suite of protocols, network hardware, network software, standardization, guided transmission media, wireless transmission, switching and routing" data link layer, Ethernet and IP addressing. It involves practical session on Cabling and crimping, Configuring TCP/IP, Peer to Peer Networking, Sharing Files, Sharing Printers, Client-server Networking, Steps for Creating a home or small office Network, Experiencing collaboration tools, installing & Configuring Network Operating System, Exploring Server Roles, Setting up a DNS Server, setting up a DHCP server, Domain controller and IP Addressing, Basic concepts of wireless networking.	
Learning Outcome	<p>Upon successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ● Describe the basics of data communications, network and network equipment ● Explain the benefits and the need for network ● Understand data transmission and transmission media ● Understand Protocols and various networking components ● Understand TCP/IP & OSI Reference Model ● Demonstrate cable crimping, establishing, setup and troubleshooting Networks ● Understand basic concepts of addressing, switching and routing ● Understand network security and data integrity ● familiarize themselves with wireless networking 	
Course Content		
Unit	Topic	Week
1	Introduction <ul style="list-style-type: none"> ● History & overview of Networks, impact of Networks on daily life ● The network as a platform ● Network Role & Elements ● Network Architecture Characteristics ● Computer Networks Versus Human Network 	1-2
2	Data Communications <ul style="list-style-type: none"> ● What is communication? ● The platform for communication ● Data transmission ● Components of the network 	3-4
3	Network Types <ul style="list-style-type: none"> ● LANs, WANs and Internetworks ● Peer to peer versus Server based Networks ● Packet-switched and Circuit switched networks ● Network cabling & Topologies 	5
4	Protocols <ul style="list-style-type: none"> ● Rules & Network Protocols ● Protocol suites & Industry Standards ● Layered Models 	6-7

Mid Semester Week		8
5	OSI Reference Model <ul style="list-style-type: none"> • Layered Framework of OSI • Overview & functions of each layer 	9-10
6	Switching & Multiplexing <ul style="list-style-type: none"> • Switching Concept and Types • Multiplexing Concepts and Types • Introduction to Ethernet & Wireless Networks 	11
7	Introduction to IP Addressing and Subletting <ul style="list-style-type: none"> • Classful & Classless Addressing • Subletting and Variable Length Subnet Masking (VLSM) 	12-13
8	Data Security and Integrity <ul style="list-style-type: none"> • Fundamentals of secure networks; cryptography • Encryption and privacy • Authentication protocols • Firewalls • Virtual private networks • Transport layer security 	14
Textbook:	Computer Networking: Beginner's guide for Mastering Computer Networking and the OSI Model (Computer Networking Series Book 1), 2017 by Ramon Nastase	
References:	<ol style="list-style-type: none"> 1. Introduction to Computer Networking: Your First Steps into How the Internet and Networks Work, 2018, by Ramon Nastase 2. Computer Networks: A Systems Approach, 2011, by Larry L. Peterson and Bruce S. Davie 3. Data Communications and Computer Networks: A Business User's Approach, 2015, by Curt White 4. Data Communications and Computer Networks, 2014, by Prakash C. Gupta 	
Teaching strategy:	Instructor delivers lectures, conducts lab session, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.5 IT155 Data Communications and Computer Networks II

Prerequisites:	IT154	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester I	
Description:	The course addresses current systems and network administration issues in organizations. Content includes: Organizational context of information systems, management of information systems from the perspective of systems and network administration. IS/IT architecture and infrastructure: Centralized, decentralized, and distributed computing, overview of computer networking including wireless networks based on TCP/IP, WAN technologies, the various network operating systems, application servers. Network design issues: design principles, requirements, topology option, network design and implementation project management. Administration issues: user administration, connectivity administration, operating systems administration, application server's administration, backup administration. Security: basic notions, threats and security mechanisms, firewall, intrusion detection and response, security strategy and risk management, legal and social issues. configuration of systems,	
Learning Outcomes:	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> ● Demonstrate their knowledge of the theories and models related to computer networking ● Make system study, design and implement computer networks ● Describe and justify the tasks and roles of systems and network administrators in organizations thereby be able to participate in organizing and implementing IS unit in organizations ● Feel confidence in enabling efficient administration of systems and services in networked environments ● Prepare documentations for network design, installation and configuration of networks, and network and system usage policy matters. 	
Course Content		
Unit	Topic	Week
1	Systems Concepts <ul style="list-style-type: none"> ● Systems theory and Organizational Concepts ● Information Systems ● Information Management (Information Systems Management) 	1
2	Fundamental Concepts <ul style="list-style-type: none"> ● Protocols and protocol layering (TCP/ IP) ● Frame, IP Packet, TCP and UDP segment ● Network devices, IP addressing (subnetting and supernetting) ● Address resolution protocol (ARP) ● ICMP, VLAN, Routing ● Routing protocols 	2-3
3	Wireless Networks and WAN Technologies <ul style="list-style-type: none"> ● WLAN(Wi-Fi)(ad-hoc and infrastructure WLAN) ● ISDN, Frame relay and ATM, DSL and others 	4-5
4	Network Design and Implementation <ul style="list-style-type: none"> ● Design principles ● Requirements 	6-7

	<ul style="list-style-type: none"> • Topology option • Network design and implementation project management 	
Mid Semester Week		8
5	<p>Network Items Specification</p> <ul style="list-style-type: none"> • Host specifications (Hardware Servers) • Network operating Systems (System platforms) • Database management systems • Web, ftp, mail, proxy, directory, multimedia, DNS/DHCP servers 	9-10
6	<p>Systems and Network Administration Issues</p> <ul style="list-style-type: none"> • Tasks of systems and network administrators • Basic configuration and administration tools • Network administration, Configuring switches, routers • Directory service (user administration), Mail administration • Web/ftp administration • Database systems administration • Remote access administration • Backup administration • DNS/DHCP administration • Proxy server administration 	11-12
7	<p>Security</p> <ul style="list-style-type: none"> • Backup/recovery/ Disaster Recovery • OS security features • Antivirus, Firewall, Intrusion Detection Systems 	13
8	<p>Specials</p> <ul style="list-style-type: none"> • IS/IT management structure • Troubleshooting (Hardware, Software, Network) • Documentation (requirements, design, installation, configuration of systems, etc.) • Policy related issues 	14
Textbook:	Computer Networks: A Systems Approach (The Morgan Kaufmann Series in Networking), 2011, by Larry L. Peterson and Bruce S. Davie	
References:	<ol style="list-style-type: none"> 1. Data Communications and Computer Networks: A Business User's Approach, 2015, by Curt White 2. Data Communications and Computer Networks, 2014, by Prakash C. Gupta 3. The Practice of Network Security Monitoring: Understanding Incident Detection and Response, 2013, by Richard Bejtlich 	
Teaching Strategy	Lectures, conducts lab sessions, group discussion, projects by discussion with student, advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.6 IT146 Database Systems I

Prerequisites:	IT107	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester II	
Description:	The course covers the following topics: Database concepts related to data handling techniques, definition of a database and benefits of database systems, functions and components of DBMS. Architecture for database systems: ANSI SPARC architecture architectures, data model concepts and basic types of data models (Hierarchical, Network and Relational data models). Emphasize on Relational data model: data structures and integrity rules. Three levels Database design: (Conceptual, Logical and Physical Database designing). Basics of Relational Languages (Relational Algebra, Relational calculus and SQL), normalization as a process for verification of data model design, SQL interaction with programming interfaces.	
Learning Outcomes:	<p>At the end of the course students should be able to:</p> <ul style="list-style-type: none"> ● Explain what a Database System is, and be able to identify its characteristics and applications, ● Explain the different models of database, ● Design ER models from specifications and interpret them into relational tables, ● Write SQL statements for data creation and manipulation purposes, ● Describe how to optimize databases to the most efficient form, ● Distinguish and use relational model and relational algebra, ● Identify and fix the possible problems that may occur in securing data. 	
Course Content		
Unit	Topic	Week
1	Introduction <ul style="list-style-type: none"> ● Data Handling approaches ● Roles in Database Design & Development ● The ANSI-SPARC Architecture ● Functions of DBMS ● Data models and conceptual models ● Database Languages (DDL, DML,DCL) 	1-2
2	Relational Data Model <ul style="list-style-type: none"> ● Terminologies ● Relational Constraints, Relational Integrity ● Key constraints ● Referential constraints ● Relational languages and views ● Relational DBMS 	3-5
3	Conceptual Database Design E-R Modelling <ul style="list-style-type: none"> ● Database Development Life Cycle ● E-R model ● Problem with E-R models ● Enhanced E-R models 	6-7
Mid Semester Week		8
4	Logical Database Design <ul style="list-style-type: none"> ● Normalization ● Process of normalization (1NF, 2NF, 3NF) 	9-10

5	Physical Database Design <ul style="list-style-type: none"> Physical Database design Process Database design and implementation for relational databases 	11
5	Query Languages <ul style="list-style-type: none"> Relational Algebra Relational calculus Structured Query Languages (SQL) 	12-14
Textbook:	Fundamentals of Database Systems (7th Edition), 2015, by Ramez Elmasri and Shamkant B. Navathe	
References:	<ol style="list-style-type: none"> Database Systems: A Practical Approach to Design, Implementation, and Management (6th Edition), 2014, by Thomas Connolly and Carolyn Begg Database Systems: Design, Implementation, & Management, 2014, by Carlos Coronel and Steven Morris. 	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.7 IT221 Systems Analysis and Design I

Prerequisites:	IT107	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester I	
Description:	The purpose of the course is to familiarize students with common problems and approaches to their solutions in studying, analyzing, developing and maintaining information systems. It includes contents; organization and management; various roles in IS development; IS development life cycle; information systems development methodologies; approaches to IS development; Structured systems analysis and design concepts; Structured analysis; fact finding techniques; analysis tools and techniques for requirements structuring. Individual and/or team project involving reports and walk-through in systems analysis and general design is also a major component of this course using CASE tools.	
Learning Outcomes:	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> ● Describe concepts underlying system development using structured approach ● Describe the different participants in the system analysis and design process ● Understand the system development process of structured approach, from planning through analysis and design to implementation and maintenance. ● Clearly define problems, opportunities, or mandates that initiate projects. ● Demonstrate the use of various Systems Design techniques, including Application and Architecture Modelling, and Prototyping ● Understand the widely used methodologies, techniques and tools of System Development in structured approach. ● Demonstrate the study, model and design of new systems ● Apply various tools (Ms Project, Ms Visio) to support the planning, analysis and design of an IS project. 	
Course Content		
Unit	Topic	Week
1	Basic Concepts in Information System Development <ul style="list-style-type: none"> ● Definitions, system thinking ● types and characteristics of information and systems ● participant in information system development ● the modern system analyst ● the multiple roles of the analyst ● information systems building blocks ● qualities of system development ● system development methodologies, processes/phase 	1-2
2	System Development: Problem Identification, Selection and Planning Phase <ul style="list-style-type: none"> ● Problem identification ● problem definition: symptoms vs. problems ● prioritizing problems ● project initiation and planning ● planning tools and techniques ● Gantt & PERT 	3-4

3	System Development: Analysis Phase <ul style="list-style-type: none"> • Data collection • determining scope and measurable objectives • defining business needs in systems terms • system requirement determination/determination: sources, tools and techniques • Process, logic, and data Modelling 	5-7
Mid Semester Week		8
4	System Development: Design Phase <ul style="list-style-type: none"> • Purpose and deliverables • logical and physical design • Databases design • Human interface design • Program design 	9-11
5	Systems Implementation and Maintenance Phase <ul style="list-style-type: none"> • System Support, maintenance, enhancement, reengineering, and design recovery System testing techniques; • Systems and user documentation; • user training guidelines; • Developing installation plans; • conversion techniques; • Types and procedures of system maintenance • Post installation follow-up 	12-13
6	Current Trends in Systems Development	14
Textbook:	Modern Systems Analysis and Design (8th Edition), 2016, by Joseph Valacich and Joey George	
References:	1. Systems Analysis and Design, 2014, by Alan Dennis and Barbara Haley Wixom 2. Systems Analysis and Design Methods, 2005, by Jeffrey Whitten and Lonnie Bentley.	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which includes: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.8 IT222 Systems Analysis and Design II

Prerequisites:	IT221	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester II	
Description:	The course covers introduction to Object Technology; Principles of Modelling, Principles of Object Orientation; systems development using the object technology; Modelling; principles of modelling; requirements gathering and modelling using use case; techniques of modelling static and dynamic aspects of systems; finding classes and objects; Interaction Diagrams – sequence and collaboration diagrams; Class Diagrams; object diagram; activity diagram; State chart diagrams; component diagram; deployment diagram. Individual and/or team project involving reports and walk-through in systems analysis and design is also a major component of this course using CASE tools.	
Learning Outcomes:	<p>On successful completion of the course students will be able to:</p> <p>Differentiate structured approach from object oriented approach</p> <ul style="list-style-type: none"> ● Explain the need for object oriented systems analysis and design ● Compare and contrast conventional and object oriented software development methodologies ● Demonstrate the application of Unified Modelling Language (UML) ● Apply software development process principles, and practices and create a high quality software ● Understand the object technology and modelling principles. ● Know the techniques of modelling aspects of systems ● Analyze user requirements using UML of OO techniques. ● Make a detailed design with OO techniques. 	
Course Content		
Unit	Topic	Week
1	Object Orientation the new software paradigm <ul style="list-style-type: none"> ● Structured paradigm Vs object oriented paradigm ● The potential benefits of object orientation ● The potential drawbacks of object orientation ● The object orientation software process 	1-2
2	Understanding the Basic Object oriented Concepts <ul style="list-style-type: none"> ● OO concepts from structured point of view ● Abstraction, Encapsulation and information hiding ● Inheritance, Association and Aggregation ● Collaboration ● Persistence ● Coupling and Cohesion ● Polymorphism ● Interfaces and Components ● Patterns 	3-4
3	Gathering user requirements <ul style="list-style-type: none"> ● Putting together requirements gathering team ● Fundamental requirements gathering techniques ● Essential Use Case Modelling ● Essential User Interface Prototyping 	5-6

	<ul style="list-style-type: none"> • Domain modelling with class responsibility collaborator (CRC) cards • Developing a supplementary Specification Identifying Change Cases 	
4	Ensuring Requirements are correct: Requirement validation Techniques <ul style="list-style-type: none"> • Testing Early and Often • Use Case Scenario Testing 	7
Mid Semester Week		8
5	Determining What to Build: OO Analysis <ul style="list-style-type: none"> • System Use Case Modelling • Sequence Diagrams: From Use Cases to Classes • Conceptual Modelling: Class diagrams • Activity diagramming • User interface prototyping • Evolving supplementary specification • Applying Analysis patterns Effectively • User Documentation • Organizing models with packages 	9-10
6	. Determining How to Build System: OO Design <ul style="list-style-type: none"> • Layering models :Class Type Architecture • Class Modelling • Applying Design Patterns effectively • State chart modelling • Collaboration Modelling • Component Modelling • Deployment Modelling • Relational Persistence Modelling • User Interface Design 	11-12
7	Object Oriented Testing and Maintenance	13
8	Software process	14
Textbook:	Practical Object-Oriented Design: An Agile Primer Using Ruby (2nd Edition), 2018, by Sandi Metz	
References:	1. Systems Analysis and Design: An Object-Oriented Approach with UML, 2015, by Alan Dennis and Barbara Haley Wixom 2. Software Engineering, 10th Edition, 2017, by Ian Sommerville	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.9 IT247 Database Systems II

Prerequisites:	IT146	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester I	
Description:	This course covers Query processing and optimization; database administration, performance tuning, recovery and backup; object-oriented database, design techniques, and implementation issues; advanced and emerging database systems concepts such as data warehousing and data mining.	
Learning Outcomes:	At the end of this course the students will be able to: <ul style="list-style-type: none"> ● Explain database query processing and optimization ● Explain the basics of transaction management ● Describe database security ● Use different recovery methods when there is a database failure 	
Course Content		
Unit	Topic	Week
1	Transaction Management and Concurrency Control <ul style="list-style-type: none"> ● Transaction ● Transaction Support ● Concurrency Control <ul style="list-style-type: none"> ○ Problems of Concurrent Sharing ○ Concept of Serializability ○ Concurrency Control Mechanism ● Database Recovery ● Transaction and Recovery ● Recovery techniques and facilities 	1-2
2	Query Processing and Optimization <ul style="list-style-type: none"> ● Overview ● Query Processing steps ● Query Decomposition ● Optimization Process ● Approaches to Query Optimization ● Transformation Rules ● Implementing relational Operators ● Pipelining 	3-4
3	Database Integrity, Security and Recovery <ul style="list-style-type: none"> ● Integrity <ul style="list-style-type: none"> ○ Integrity Concept & Subsystem ○ Integrity Constraints ○ Types of Constraints ● Security <ul style="list-style-type: none"> ○ Database threats ○ Identification and Authentication ○ Categories of Control ○ Implementation of Security Subsystem ○ Data Encryption 	5-7
Mid Semester Week		8
4	Distributed Database Systems <ul style="list-style-type: none"> ● Concepts of Distributed Databases 	9-10

	<ul style="list-style-type: none"> • Distributed Database Design • Distributed Query Processing and • Distributed Transaction Management and Recovery 	
5	<p>Object Oriented DBMS</p> <ul style="list-style-type: none"> • Object Oriented Concepts (Abstraction, Encapsulation, and Information hiding) • Drawbacks of relational DBMS • OODBMS definitions • OO Database Design and Implementation • OO Data modelling and E-R diagramming • Objects and Attributes • Object Identity • Storing objects in relational database systems Assignment 	11-12
6	<p>Data warehousing and Data Mining Techniques</p> <ul style="list-style-type: none"> • Data Warehousing <ul style="list-style-type: none"> ○ Introduction ○ Benefits ○ Online Transaction Processing (OLTP) and Data Warehousing • Data Mining <ul style="list-style-type: none"> ○ Introduction ○ Data Mining Techniques 	13-14
Textbook:	Database Systems: Design, Implementation, & Management (MindTap Course List), 2018, by Carlos Coronel and Steven Morris	
References:	<ol style="list-style-type: none"> 1. Database Systems: Introduction to Databases and Data Warehouses, 2016 by Nenad Jukic and Susan Vrbsky 2. Database Design, Application Development, and Administration, Sixth Edition, 2014, by Michael Mannino 3. Database Systems: A Practical Approach to Design, Implementation, and Management (6th Edition), 2014, by Thomas Connolly and Carolyn Begg 	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.10 SE132 Object Oriented Programming

Prerequisites:	SE131	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester I	
Description:	The course is designed to introduce students on how to develop applications using object-oriented design methodology with JAVA as an illustration programming language. It includes Object Oriented Programming paradigm and its use; classes, Objects, Abstraction and Encapsulation; Inheritance, Polymorphism, Creating Graphical User interfaces (GUIs), Data Structures, Exceptions(Try, catch, and throw, finally how exceptions affect the design of an application)	
Learning Outcomes:	<p>At the end of the course students will be able to</p> <ul style="list-style-type: none"> ● Understand major concepts of object-oriented programming ● Understand the programming environment as defined by compilers, interpreters, editors, and other system software providing support for the programming activity ● Develop skills in OO design and program development within an integrated development environment ● Use arrays and other data structures ● Understand the concepts of encapsulation, inheritance ● Implement I/O functionality to read from and write to data and text files. ● Explain the application of a variety of data structures and, understand the advantages and disadvantages of those structures 	
Course Content		
Unit	Topic	Week
1	<p>Introduction to Object-Oriented Programming (OOP)</p> <ul style="list-style-type: none"> ● Overview of OOP ● Why Java? ● The JVM and Byte Code ● Basic concepts of OOP <ul style="list-style-type: none"> ○ classes ○ objects ○ members ○ class member visibility ○ encapsulation, inheritance and polymorphism 	1
2	<p>The inside of objects and classes: More on OOP concepts</p> <ul style="list-style-type: none"> ● member methods and their components ● instantiation and initializing class objects ● methods ● access specifiers ● accessors and mutators ● calling and returning methods ● static and instance members 	2-4
3	<p>Inheritance</p> <ul style="list-style-type: none"> ● Concept of inheritance ● Super classes and subclasses ● Protected members 	5-7

	<ul style="list-style-type: none"> • Overriding methods • Using this() and super() • Use of final with inheritance • Constructors in subclasses 	
Mid Semester Week		8
4	Polymorphism <ul style="list-style-type: none"> • Introduction • Relationships among objects in an inheritance hierarchy • Assigning reference of subclass to super class type variable • Assigning a super class reference to subclass-type variable • Subclass method calls via super class-type variable • Summary of allowed assignments between super class and subclass variables • Multiple inheritance and interfaces 	9-10
5	Exception Handling <ul style="list-style-type: none"> • Exception handling overview • The causes of exceptions • The Throwable class hierarchy • Handling of an exception, • The throw statement • The finally clause • User defined exceptions 	11-12
6	Files and Streams <ul style="list-style-type: none"> • Introduction, I/O classes • File and File Dialog objects • Low-Level File I/O, High-Level File I/O, Object I/O • Random Access files 	13-14
Textbook:	Beginning Java Programming: The Object-Oriented Approach, 2015, by Bart Baesens and Aimee Backiel	
References:	<ol style="list-style-type: none"> 1. Java for Programmers (Deitel Developer), 2011, by Paul Deitel and Harvey M. Deitel, 2. An Introduction to Object-Oriented Programming with Java, 2009 by C. Thomas Wu 3. Java Methods: Object-Oriented Programming and Data Structures, 2015 by Maria Litvin and Gary Litvin 	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.11 SE252 Operating Systems

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester II	
Description:	This course examines basic issues in operating system design and Implementation. It covers the tradeoffs that can be made between performance and functionality during the design and implementation of an operating system. Particular emphasis will be given to the major OS subsystems: process management (processes, threads, CPU scheduling), Memory management, file and I/O device management and deadlock), memory management (segmentation, paging, swapping) and file systems.	
Learning Outcomes:	<p>Upon the successful completion of the course students should be able to:</p> <ul style="list-style-type: none"> • Explain the objectives and functions of modern operating systems. • Describe how operating systems have evolved over time from primitive batch systems to sophisticated multiuser systems. • Analyze the tradeoffs inherent in operating system design. • Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve. • Identify potential threats to operating systems and the security features design to guard against them. • Describe how issues such as open source software are influencing operating system design. 	
Course Content		
Unit	Topic	Week
1	Overview <ul style="list-style-type: none"> • Role and purpose of operating systems • history of operating system development • Functionality of a typical operating system • Design issues (efficiency, robustness, flexibility, portability, security, compatibility) 	1
2	Processes and Threads <ul style="list-style-type: none"> • Processes • Threads (Threads model, Thread Usage, Implementing Threads • Interposes Communication (IPC) • Scheduling 	2-3
3	Memory management (Main memory) <ul style="list-style-type: none"> • Background • Logical versus Physical Address Space • Swapping • Contiguous Allocation • Paging • Segmentation. Segmentation with Paging • Direct memory access 	4-5
4	Processes management <ul style="list-style-type: none"> • Mutual exclusion: Definition of the “mutual exclusion” problem • Deadlock detection and prevention • Solution strategies • Models and mechanisms (semaphores, monitors, condition variables, rendezvous) • Interrupt handling in a concurrent environment 	6-7

	<ul style="list-style-type: none"> • Producer-consumer problems • Synchronization • Multiprocessor issues 	
Mid Semester Week		8
5	CPU Scheduling <ul style="list-style-type: none"> • Pre-emptive and non-pre-emptive scheduling • Scheduling policies • Processes and threads • Real-time issues 	9-10
6	Device management <ul style="list-style-type: none"> • Characteristics of serial and parallel devices • Abstracting device differences • Buffering strategies • Recovery from failures 	11
7	File System <ul style="list-style-type: none"> • File systems: Fundamental concepts • Content and structure of directories • File system techniques (partitioning, mounting and un-mounting, virtual file systems) • Memory-mapped files • Special-purpose file systems • Naming, searching, and access • Backup strategies 	12-13
8	8. Security and protection <ul style="list-style-type: none"> • Overview of system security • Policy/mechanism separation; security methods and devices; protection, access, and authentication; models of protection • Memory protection • Encryption • Recovery management 	14
Textbook:	Operating Systems: Internals and Design Principles (9th Edition), 2017, by William Stallings	
References:	1. Modern Operating Systems, 2016, by Tanenbaum Bos 2. Operating System Concepts Essentials, 2013, by Abraham Silberschatz and Peter B. Galvin 3. Operating Systems: An Introduction, 2017, by R. Garg and G. Verm	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.12 IT284 Introduction to Web Technologies

Prerequisites:	IT146, IT154	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester II	
Description:	<p>This course introduces students with Internet and the World Wide Web; client server architecture; web server and security, HTTP protocol; professional web page design and development; information architecture and visualization; scripting and Mark-up languages; legal and ethical issues on the web; web programming technologies, build multiple web pages and implement website design that interacts with a database. Apply Internet Programming in the day to day Business (Ecommerce)</p> <p>Using the existing technology and multimedia. This course will also give learners an overview of some of the different tools and methods that are used to create highly-tailored dynamic web content.</p>	
Learning Outcomes:	<p>The successful completion of this course enables students to:</p> <ul style="list-style-type: none"> ● Demonstrate knowledge of website development concepts ● Demonstrate knowledge of HTML, XHTML, and CSS. ● Demonstrate a significant ability to plan, design, develop, manage, and maintain HTML-based websites. ● Understand the fundamental aspects of all elements found on web pages. ● Understand and use the principles of user interface design to create user friendly, easily navigated web pages. ● Design web pages that are accessible to everyone regardless of their physical limitations or geographical location. ● Understand the process of creating content for web pages including text, images, animation, audio, and video elements. ● Create functional JavaScript for use in web pages to add interactive applications to a site. 	
Course Content		
Unit	Topic	Week
1	<p>The Fundamentals</p> <ul style="list-style-type: none"> ● Internet history, Uses and Services ● TCP/ IP Protocols ● HTTP Request Model 	1-2
2	<p>Web Design and Development</p> <ul style="list-style-type: none"> ● Gathering requirements ● Information organization and architecture ● Information Visualization 	3-4
3	<p>Introduction to Hyper Text Markup Language (HTML)</p> <ul style="list-style-type: none"> ● Introduction to Markup Languages ● Document Object Model (DOM) of HTML ● Headings, Paragraph and Breaks ● Formatting Text ● Working With List ● Working with Graphics ● Anchors, URLs and Image Maps ● Tables ● HTML Frames 	4-7

	<ul style="list-style-type: none"> • HTML Forms • ActiveX Objects and Applets • Special HTML Elements • Page Layout and Design Considerations 	
Mid Semester Week		8
4	<p>Cascading Style Sheets (CSS)</p> <ul style="list-style-type: none"> • CSS Basics • Style Sheet Rules • CSS Selectors • Style Properties • Font and Text properties • Foreground and Background properties • Layout and Positioning Properties • Type of CSS Styles • Style Inheritance • Style Rules Precedence • Style Sheet Layers 	9-10
5	<p>Client-Side Scripting Language</p> <ul style="list-style-type: none"> • Introduction • Client-Side Scripting Using JavaScript • Dynamic HTML (DHTML) 	11-13
6	<p>Introduction to Extensible Markup Language (XML)</p> <ul style="list-style-type: none"> • Overview of XML • XML Components • Document Type Definition • Data Elements • Defining Attributes and Entities • XML Schema, XML Core Technologies 	14
Textbook:	Modern Web Development: Understanding domains, technologies, and user experience (Developer Reference), 2016, by Dino Esposito	
References:	<ol style="list-style-type: none"> 1. Web Programming and Internet Technologies: An E-Commerce Approach, 2016, by Porter Scobey and Pawan Lingras 2. Web Technologies: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book, 2009, by Kogent Learning Solutions Inc. 3. http://www.w3schools.com/html/default.asp 	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.13 IT325 Software Design and Construction

Prerequisites:	SE132	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester I	
Description:	This course introduces fundamental principles and techniques of software development, how to write software that is safe from bugs, easy to understand, and ready for change. Important topics include data flow modelling, specifications and invariants; testing; abstract data types; design patterns for object-oriented programming; software quality assurance, software verification and validation planning with an emphasis on software peer reviews and software testing concepts and security testing.	
Learning Outcomes:	<p>By the end of the course, students will be able to</p> <ul style="list-style-type: none"> • Have solid foundation in Object-Oriented Design, as well as many software developments concepts that can be applied to any language. • read and use software design patterns • implement and test an object-oriented design • develop an application using online services and APIs 	
Course Content		
Unit	Topic	Week
1	Software Complexity and Modelling <ul style="list-style-type: none"> • Software Design and Production • The Software Development Life Cycle (SDLC) • Software Process Methodologies • Software Architecture • Documentation 	1
2	Software Development <ul style="list-style-type: none"> • Software Execution • General Purpose Utility and Support • Programming Language Evolution • Compilers • Software Design • ADTs • Class Construct 	2
3	Functionality <ul style="list-style-type: none"> • Control Flow , Structured Control Flow • Controlled Interruption to Sequential Execution • Readability 	3
4	Design and Documentation <ul style="list-style-type: none"> • Object-Oriented Design • Class Functionality • Constructors • Accessors and Mutators • Utility Functions, Destructors • Defensive Programming • Precondition and Post condition • OO Design Principles 	4-5
6	Structural Design <ul style="list-style-type: none"> • Relationships, Composition, Containment • Class Design: Has-a or Holds-a? 	6-7

	<ul style="list-style-type: none"> • Inheritance, Inheritance Design • Automate Subtype Checking • Code Reuse • OO Design Principles 	
Mid Semester Week		8
8	Design Alternatives and Perspectives <ul style="list-style-type: none"> • Comparative Design • Design Specifications for Inheritance • Inheritance versus Composition • Multiple Inheritance • Multiple Inheritance Imperfections • Single Inheritance with Composition 	9-11
9	Software Correctness <ul style="list-style-type: none"> • Exceptions, Exceptions and Software Design • Testing Design, Scale • Perspective, Coverage • Data Values • Software Qualities 	12-13
10	Software Longevity <ul style="list-style-type: none"> • Software Maintenance • Software Evolution • Non-functional Properties • Refactoring • Reverse Engineering 	14
Textbook:	Software Essentials: Design and Construction (Chapman & Hall/CRC Innovations in Software Engineering and Software Development Series), 2014, by Adair Dingle	
References:	<ol style="list-style-type: none"> 1. Sommerville, I.: Software engineering, tenth edition, Addison-Wesley, 2017. 2. Pressman, R.S.: Software engineering: A Practitioners Approach, sixth edition, McGraw Hill, 2005. 3. Tian, J.: Software Quality Engineering: Testing, Quality Assurance, and Quantifiable Improvement, 2005. 4. Kan, S. H.: Metrics and Models in Software Quality Engineering, second edition, 2002. 	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.14 SE381 Web Systems and Services

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester I	
Description:	The objective of this course is to discuss how the Web systems are programmed and maintained and how online pages are created and delivered by Web servers and used by clients. Topics to be covered include: Web systems and technologies, digital media, Web development, Web standards, vulnerabilities, social network software, client-side programming, server-side programming, Web services and servers, XHTML, CSS, CSS, Web systems security, JavaScript, PHP, web content management systems and emerging technologies	
Learning Outcomes:	<p>At the end of the course, students will be able to</p> <ul style="list-style-type: none"> ● Describe the core architecture of WWW as interconnected hypertext documents, the importance of Web protocols (e.g., HTTP), and the syntax and semantics of HTML, XHTML, XML, and CSS. ● Program Web applications using HTML, CSS, JavaScript and PHP. ● Implement client-side and server-side security methods for security and privacy. ● discuss how to organize information, build a website, and select graphical images, multimedia, and ● Install, operate, and administer Web servers, proxies and caches. 	
Course Content		
Unit	Topic	Week
1	Introduction to Advanced Topics on Web Engineering <ul style="list-style-type: none"> ● Web services, Semantic Web, RSS and ATOM, Captcha ● Workflow Languages 	1-2
2	Server-Side Scripting Basic <ul style="list-style-type: none"> ● Introduction to server-side scripting ● Server-side scripting languages 	3-4
3	HTML Forms and Server Side Scripting	5-6
4	Files and Directories <ul style="list-style-type: none"> ● Write to Files ● Read from Files ● Create Directories ● Upload Files ● Rename and Delete Files and Directories 	7
Mid Semester Week		8
5	Connecting to Databases <ul style="list-style-type: none"> ● Connecting to an existing Database ● Sending and retrieving data to a Database ● Modifying Existing Data ● Removing Existing Data ● Data base security using server-side scripting 	9-10
6	Cookies and Sessions <ul style="list-style-type: none"> ● Describe the stateless model ● Explain the concepts of maintaining state with sessions 	11-12

	<ul style="list-style-type: none"> • Create and Read data from sessions • Putting PHP session IDs in pages • Create and Read data from Cookies • Destroy a session • Maintain session data using Cookies • Add Parameters to a Cookie • Delete a Cookie 	
7	<p>Content Management Systems (CMS)</p> <ul style="list-style-type: none"> • Concepts of MS • CMS Development software 	13-14
Textbook:	Services: Concepts, Architectures and Applications (Data-Centric Systems and Applications), 2010, by Gustavo Alonso and Fabio Casati.	
References:	<ol style="list-style-type: none"> 1. Web Content Management: Systems, Features, and Best Practices, 2016, by Deane Barker 2. Web Services: Principles and Technology, 2007, by Michael Papazoglou 3. Web Programming and Internet Technologies: An E-Commerce Approach, 2016, by Porter Scobey and Pawan Lingras 	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.15 SE327 Enterprise Systems

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester I	
Description:	The course provides insights into theoretical concepts and current practice of enterprise systems. The course is designed to develop students' knowledge about enterprise systems and to provide hands-on experience with enterprise systems applications. Through lectures and seminars, students learn about opportunities, challenges and approaches to enterprise systems implementation and use, and develop critical thinking skills.	
Learning Outcomes:	<ul style="list-style-type: none"> • describe properties and architectures of enterprise systems, • account for strategies and approaches for implementation and use of enterprise systems, • explain how enterprise systems support organizations. • analyze implementation and use of enterprise systems from a socio-technical perspective, • apply socio-technical models and provide recommendations for implementation and use of enterprise systems implementation, • discuss and present critical issues related to implementation and use of enterprise systems. • critically assess the role of enterprise systems in organizations, • argue for different enterprise systems solutions. 	
Course Content		
Unit	Topic	Week
1	Fundamentals of enterprise systems, <ul style="list-style-type: none"> • Enterprise Resource Planning, • Supply Chain Management, • Customer Relationship Management, • evolution of enterprise systems • Enterprise systems in organisation. 	1-2
2	Acquisition of Enterprise Information Systems <ul style="list-style-type: none"> • Main decisions in acquiring EIS, • Roles and responsibilities, • the business case, • risks and risk management • ethical aspects. 	3-4
3	Management aspects of ES <ul style="list-style-type: none"> • Methods and approaches to ES implementations, • managing risks • critical success factors in EIS projects. • opportunities and challenges of enterprise systems in organisations. 	5-6
4	Architectural aspects of IT systems: <ul style="list-style-type: none"> • Overall structure of EIS its relation to organizational structure • business processes, new trends in EIS provisioning. • Concepts of business process management 	7
Mid Semester Week		8
5	Organizational change and change management <ul style="list-style-type: none"> • Strategic alignment • User commitment 	9-11

	<ul style="list-style-type: none"> • Communications • Training • Job redesign • Governance of processes and data 	
6	<p>Business Process Implementation</p> <ul style="list-style-type: none"> • Post-implementation issues • Enterprise system processes • Order processing • Purchasing • Production logistics • Accounting • Planning and control 	12-13
7	<p>Human Resources</p> <ul style="list-style-type: none"> • Human resource functions • How enterprise systems support business 	14
Textbook:	The Practice of System and Network Administration: Volume 1: DevOps and other Best Practices for Enterprise IT (3rd Edition), 2016, by Thomas A. Limoncelli and Christina J. Hogan	
References:	<ol style="list-style-type: none"> 1. Luisi, James (2014). Pragmatic Enterprise Architecture: Strategies to Transform Information Systems in the Era of Big Data 2. Motiwalla, Luvai and Thompson, Jeffrey (2011) Enterprise Systems for Management. 2nd Edition. 3. Giachetti, Ronald E. (2010) Dunn, Cheryl; Cherrington, J. Owen and Hollander, Anita (2004). Enterprise Information Systems: A Pattern-Based Approach 	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.16 IT328 IT Systems Acquisition and Integration

Prerequisites:	SE327	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	The objectives of this course are to enable students to apply the techniques for information requirement. determination and acquire the appropriate computer systems; The course also provides students the knowledge in cost estimates of information systems; It also gives students the opportunity to integrate information systems in terms of hardware, software, and communications;	
Learning Outcomes:	<p>On completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ● better understand the information requirements in business environments; ● understand the cost involved in system integration; ● practise different system integration mechanisms via case studies and presentation. ● demonstrate an understanding of the problems and challenges of acquiring and integrating ICT Systems; ● Recognize technical challenges when implementing a new IT application; 	
Course Content		
Unit	Topics	Week
1	IS Planning and Acquisition Methods: <ul style="list-style-type: none"> ● Information requirement analysis ● IS application portfolio ● Evaluating IS investments ● Selection of Hardware and Software Components 	1-3
2	IT Systems Cost Estimation: <ul style="list-style-type: none"> ● System Cost Estimation ● Work-breakdown structure ● Procurement vs. Implementation ● Acquisition models 	4-6
3	System Integration: <ul style="list-style-type: none"> ● IT technologies and their applications to system integration ● Some useful technologies (Object-oriented technologies, Electronic Data Exchange, Data communication and networking, Document Centre Technology, ATM and ISDN etc ● Case studies of system integration 	7-10
Mid Semester Week		8
4	Systems Acquisition Integration Techniques: <ul style="list-style-type: none"> ● Business Acquisition Strategies, Type, Goal ● Systems Integration Strategies ● Fit between Business and IS Strategies 	9-11
5	Ethical Issues <ul style="list-style-type: none"> ● Corporate Corruption ● Bias in Procurement 	12-14
Textbook:	1. B. Craig Meyers and Patricia Oberndorf, 2001, Managing Software Acquisition: Open Systems and COTS Products, Addison-Wesley.	

References:	<p>2. Earl, 1989, Management Strategies for Information Technology, Prentice-Hall.</p> <p>3. Lozinsky, 1998, Enterprise-wide Software Solutions: Integration Strategies and Practices, Addison Wesley.</p> <p>There will also be supplemental readings beyond the References Textbook, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>
Resource Req. :	None
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.

3.1.17 IT358 Cyber Security and Ethical Hacking

Prerequisites:	SE381	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	This course is designed to provide a basic introduction to of all aspects of cyber-security including business, policy and procedures, communications security, network security, security management, legal issues, political issues, and technical issues. The course also introduces students with the concept of ethical hacking and will get a hands-on environment where they will be shown how to conduct ethical hacking. They will be exposed to achieving optimal information security posture in their organization by hacking. They will scan, test, hack and secure their own systems.	
Learning Outcomes:	<p>At the end of the course, students will be able to</p> <ul style="list-style-type: none"> ● identify some of the factors driving the need for network security ● identify and classify particular examples of attacks ● define the terms vulnerability, threat and attack ● identify physical points of vulnerability in simple networks ● Understand the nature of secure software development, operating systems and data base design ● Outline ethical considerations of hacking ● Identify methods to gain access to systems ● Explain common physical security weaknesses 	
Course Content		
Unit	Topic	Week
1	Introduction <ul style="list-style-type: none"> ● Concepts of Computer Security ● Threats ● Harm ● Vulnerabilities ● Control 	1
2	Toolbox: Authentication, Access Control, and Cryptography <ul style="list-style-type: none"> ● Authentication ● Access Control ● Cryptography 	2-3
3	Programs and Programming <ul style="list-style-type: none"> ● Unintentional (Non-malicious) Programming Oversights ● Malicious Code—Malware ● Countermeasures 	4
4	The Web—User Side <ul style="list-style-type: none"> ● Browser Attacks ● Web Attacks Targeting Users ● Obtaining User or Website Data ● Email Attack 	5-6
5	Operating Systems <ul style="list-style-type: none"> ● Security in Operating Systems ● Security in the Design of Operating Systems 	7

Mid Semester Exam		8
6	Networks <ul style="list-style-type: none"> • Threats to Network Communications • Wireless Network Security • Cryptography in Network Security • Firewalls • Intrusion 	9-10
7	Databases <ul style="list-style-type: none"> • Security Requirements of Databases • Reliability and Integrity • Database Disclosure 	11
8	Cloud Computing <ul style="list-style-type: none"> • Moving to the Cloud • Cloud Security Tools and Techniques • Cloud Identity Management • Securing IaaS 	12
9	Ethical Hacking <ul style="list-style-type: none"> • Concepts of Ethical Hacking • Types of Hackers • Hacking methodologies and tactics 	13-14
Textbook and References	<ol style="list-style-type: none"> 1. Cyber security: The Essential Body Of Knowledge, , 2011, by Dan Shoemaker and Wm. Arthur Conklin 2. Principles of Information Security (MindTap Course List) 2017, by Michael E. Whitman and Herbert J. Mattord 3. Principles of Information Security, 2014, by Michael E. Whitman and Herbert J. Mattord 4. "Black Hat Python: Python Programming for Hackers and Pentesters", First Edition, 2014, by Justin Seitz, 5. "Gray Hat Hacking The Ethical Hacker's Handbook", Fourth Edition, 2015, by Daniel Regalado et al., 6. "The Hacker Playbook: Practical Guide to Penetration Testing", 2014, by Peter Kim. 	
Particular Resource Req.:	Lab hours is required / Python Development Environment	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.18 SE366 Methods for IS Research

Prerequisites:	MT361	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	This course enables students to understand concepts and application of research. It attempts to define what research is, why they do research, and the various methods that researchers use to investigate problems. It is designed as an under-graduate introduction to research methodology in software engineering and information systems. The course provides a framework for conceptualizing research and is meant to underpin the research project for the final year. Special focus will be made in Design Science Research	
Learning Outcomes:	<p>At the end of the course students will be able to understand:</p> <ul style="list-style-type: none"> ➤ The terminologies used by professional researchers employing scientific thinking ➤ How to identify research topics ➤ How to formulate research questions ➤ The basic types of research ➤ The concept of design Research and its use in Software Engineering ➤ The process for selecting the appropriate and optimal communication approach ➤ some of the research topics in the area of software engineering ➤ Scientific research writing 	
Course Content		
Unit	Topics	Week
1	<p>Overview of research:</p> <ul style="list-style-type: none"> • Essence of Research; • Types of research methods; case study methods; Action Research, Ethnography, etc.; • Research in Information Systems; • Research Vs Project; • Research Questions. 	1-2
2	<p>Design science research paradigm:</p> <ul style="list-style-type: none"> • Placing Design Science Research in Context; • Difference between routine design practice and design science research.; • Key properties of four design science research paradigms: ontology, epistemology, methods, and ethics; • Review of Literature 	3-5
3	<p>Design Science Research Process:</p> <ul style="list-style-type: none"> • The general design cycle: • problem identification and motivation; • objectives of a solution; • design and development; • demonstration and evaluation communication. 	6-7

Mid Semester Week		8
4	Research Design: <ul style="list-style-type: none"> • Situational inquiry; • Build process (proposing, demonstration and construction of artifacts); evaluation through reflection and testing; • Use of ethnography, • Participatory approach to guide the research process 	9-11
5	Research writing: <ul style="list-style-type: none"> • Research report writing; • Writing a research proposal; • current research topics in IS; E • Ethics in research 	12
Presentation of Assignments and Discussions		13-14
Textbook and References:	<ol style="list-style-type: none"> 1. Hevner, Alan and Chatterjee, Samir (2010) Design Research in Information Systems: Theory and Practice. Integrated Series in Information Systems 22. Springer. 2. Williamson, Kirsty and Johanson, Graeme (2013) Research Methods: Information, Systems and Contexts 3. King, Ronald S. (2012). Research Methods for Information Systems 4. Aileen, Cater-Steel and Latif, Al-Hakim (2008). eds. Information Systems Research Methods, Epistemology, and Applications (Premier Reference Source) 	
Particular resource req.:	SPSS statistical package software, Online data Collection tools.	
Teaching strategy:	Instructor delivers lectures, conducts lab session, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.1.19 IT374 IT Needs Assessment and Management

Prerequisites:	SE327	
Credit Hours:	3 (ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	<p>In this course students will develop the knowledge and skills needed to identify and address organization's IT needs. The primary focus of this course will be helping students develop proficiencies in selecting and using various needs assessment methods. They will also work on ways to present the results of the needs assessment in a professional package that can easily be submitted to a colleague, supervisor, or an external client. The course also covers topics on how to assimilate, identify and analyze modern IT infrastructures and emerging technologies for an organization / enterprise. Students will learn how to leverage the IT infrastructure and emerging technologies to best serve the organizational needs and enhance the enterprise's competitive position.</p>	
Learning Outcomes:	<p>Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> ● Identify and critically analyze opportunities or problems for which Information Systems can provide solutions. ● Carry out in-depth study and research, both individually as well as in teams, to address IT needs of an organization ● defend and disseminate results of assessments to a range of audiences ● familiarize themselves with ethical, legal, security and socio-technical issues related to information systems ● Analyze and appraise the technical, managerial, security, regulatory, and ethical issues associated with the acquisition, deployment, and management of systems. 	
Course Content		
Unit	Topics	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> ● Concepts in IT Management ● Importance of IT needs assessment ● IT Needs assessment planning <ul style="list-style-type: none"> ○ Clarifying existing problems ○ Establishing the objectives ○ Participants of the Needs Assessment Process ○ Presentation of Cases 	1-3
2	<p>IT Situation Assessment and Requirements Evaluation</p> <ul style="list-style-type: none"> ● <i>Gathering Needs-Related Information</i> ● Reviewing and Prioritizing Need ● Documenting Results ● Security and Ethical Standards ● Presentation of cases 	4-7
Mid Semester Week		8
	<p>Business Process Analysis</p> <ul style="list-style-type: none"> ● Process analysis techniques ● Study of work flows ● Assessment of existing performance standards ● Analyzing deficiencies in IT knowledge ● Working towards ideal workflow setup 	9-10

	<ul style="list-style-type: none"> Challenges in Business process analysis 	
	<p>Emerging Technologies</p> <ul style="list-style-type: none"> Survey of emerging technologies Assessment and Evaluation of emerging technologies Case Analysis 	11 - 12
	<p>IT and Business Management</p> <ul style="list-style-type: none"> The need to Align IT with business <ul style="list-style-type: none"> Technical security issues Ethical issues associated with the deployment of IT. Managerial issues associated with aligning IT with business Risk analysis and management 	13-14
Textbook and References:	<ol style="list-style-type: none"> The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, 2016, by Gene Kim and Patrick Debois Technical Impact: Making Your Information Technology Effective, and Keeping It That Way, 2014, by Al Kuebler Information and Communication Technology in Organizations: Adoption, Implementation, Use and Effects, 2005, by Harry Bouwman and Bart van den Hooff <p>There will also be supplemental readings beyond the References Textbook, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Resource Req.:	None	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.20 SE421 Systems Thinking and Systems Approach

Prerequisites:	SE327	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester I	
Description:	This course focuses on approaches to systems thinking; systems-thinking method; Systems Thinking Guide in the work place. Systems thinking as a method and tool for managing change, solving complex problems, and creating individual and team learning. Topics covered in this course include systems thinking principles, types of systems, complexity, application of systems thinking in the work place.	
Learning Outcomes:	<p>On successful completion of this course students will be able to:</p> <ul style="list-style-type: none"> ● Gain an understanding of the language and concepts of systems, systems thinking, and complexity, and their implications for the workplace ● Gain an understanding of specific types of systems, that may be at play within complex problems ● Practice using a comprehensive Systems Thinking Guide to apply in understanding of systems thinking to a challenging situation and opportunity ● Develop an action plan to deal with the organizational problem and opportunity ● Gain an understanding of how to use systems thinking in a variety of situations 	
Course Content		
Unit	Topics	Week
1	Systems thinking general concepts <ul style="list-style-type: none"> ● Objects and events ● Structure, behaviour and discipline ● Matter, energy and information ● Historical background of system concept ● General system theory ● Systems thinking ● Human being as a complete and superior system 	1-3
2	System and related concepts <ul style="list-style-type: none"> ● Different levels of system concepts ● System environment concept ● Systems hierarchies ● System types, inputs and outputs ● Entropy and its concept in systems 	4-7
Mid Semester Week		8
3	<ul style="list-style-type: none"> ● System structure, behaviour and discipline ● System structure ● Systems behaviour ● Systems discipline ● Stability as structural balance ● Behavioural equilibrium ● Disciplinary certainty 	9-11
4	Systems thinking <ul style="list-style-type: none"> ● Systems thinking concept ● Systems thinking methods and tools ● Systems description in ordinary language 	12-14

	<ul style="list-style-type: none"> • Abstraction • Modelling and simulation • System diagrams • Soft systems • Hard systems 	
Textbook and References:	<ol style="list-style-type: none"> 1. Systems Thinking For Social Change: A Practical Guide to Solving Complex Problems, Avoiding Unintended Consequences, and Achieving Lasting Results, 2015, by David Peter Stroh 2. Gharakhani Bahar (2014) System and Systems Thinking: (Whole Review) 3. Jimmy Brown (2012) Systems Thinking Strategy: The New Way to Understand Your Business and Drive Performance 4. David Kerr (2012) An Introductory Guide to Systems Thinking 5. <u>Jamshid Gharajedaghi</u> (2011) . Systems Thinking, Third Edition: Managing Chaos and Complexity: A Platform for Designing Business Architecture 	
Particular Resource Req.:	None	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.21 IT471 IT Project Management

Prerequisites:	SE327	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester I	
Description:	The course covers topics such as IS plans and projects; practical examination of how projects can be managed from start to finish; stages of project planning and project life-cycle; project selection from an organizational perspective, project initiation and scope development; team building and leadership; project costing, scheduling, and identifying and managing risks; product quality assurance techniques, project resource identification and allocation; project contracts management; progress and performance measurement and evaluation, project audit and closure; automated project management tools; ethical issues in project management.	
Learning Outcomes:	<p>On successful completion of this course, students will be able to</p> <ul style="list-style-type: none"> ● Define project management terms and techniques ● Become familiar with project cost estimation and scheduling techniques and models ● Apply appropriate methodologies to prepare baseline project budget and schedule for a new project ● Identify important risks facing a new project ● Apply appropriate techniques to assess ongoing project performance ● Explain and discuss the phases and knowledge framework for the methods used in II project management ● Apply project management process concepts by working on a team project as project manager or active team member. <p>There will also be supplemental readings beyond the References Textbook, such as articles or web pages, which will be assigned by the instructor throughout the semester.</p>	
Course Content		
Unit	Topics	Week
1	Introduction to IT Project Management <ul style="list-style-type: none"> ● Projects and Project Management ● Project Life Cycle Models and Paradigms 	1
2	IS Project Scope Management & Planning <ul style="list-style-type: none"> ● Project Planning ● Project Scope Management ● Project Time Management ● Project Cost Management ● Project Risk Management 	2-5
3	Project Organization <ul style="list-style-type: none"> ● Project Roles and Team Organization ● Staffing the Project ● Training ● Project Communication 	6-7
Mid Semester Week		8
4	Productivity and Quality <ul style="list-style-type: none"> ● Measurement ● Quality Assurance 	9-11
5	Remnants <ul style="list-style-type: none"> ● Project Procurement Management 	12-14

	<ul style="list-style-type: none"> • Project performance measure and evaluation • Post-Project audits • Ethical issues in project management 	
Textbook and References:	<ol style="list-style-type: none"> 1. Kathy Schwalbe. (2015). Information Technology Project Management (6th Ed.) 2. Project Management College (2013) A Guide to the Project Management Body of Knowledge: PMBOK(R) Guide 3. Fuller, Mark, Valacich, Joe and George, Joey (2010) Information Systems Project Management: A Process and Team Approach 4. Avison, David E. and Torkzadeh, Gholamreza (2008) Information Systems Project Management 	
Particular Resource Req.:	<p>Computer lab</p> <p>Ms-Project (2000 or later version)</p> <p>Ms-Office Visio (2003 or later version)</p>	
Teaching Strategy	<p>Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.</p>	
Assessment:	<p>The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.</p>	

3.1.22 SE422 Information Assurance and Systems Security

Prerequisites:	IT358	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester II	
Description:	<p>The course provides an introduction to information assurance. It covers fundamental concepts necessary to understand the threat to security as well as various defences against those threats. IT also examines fundamentals of network security involved in creating and managing secure computer network environments. Both hardware and software topics are considered, including authentication methods, remote access, network security architectures and devices, cryptography, forensics and disaster recovery plans.</p>	
Learning Outcomes:	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> • Define key terms and concepts of information assurance, • Identify various threats, attacks and vulnerabilities to a computer system, • Describe legal and ethical issues of information security, • Identify various technical approaches to access control, intrusion detection and incident response • Apply cryptography security technique, systems and Network security applications. • understand how network security is conceptualized and carried out • analyze both early and contemporary threats to network security • familiarize themselves to concepts of cyber security and ethical hacking 	
Course Content		
Unit	Topics	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> • Definition of Information Systems Security • Critical concepts of Information Security • Security/Privacy Vulnerabilities 	
2	<p>Fundamentals of IS Security</p> <ul style="list-style-type: none"> • IS Security Fundamentals • Components of Information Systems security • Principles of Information Systems Security • Introduction to IS Security Policy • Planning, Design and Implementation of IS Security 	
3	<p>Attack Types and Protection Schemes</p> <ul style="list-style-type: none"> • Categories of Attack Types and Security threats • Vulnerabilities of Information Systems • Malicious Security Threats <ul style="list-style-type: none"> ○ viruses ○ worms ○ Trojan horses ○ Spyware • Categories of Security controls 	
4	Security Techniques	

	<ul style="list-style-type: none"> • Cryptography <ul style="list-style-type: none"> ○ Introduction ○ Definitions and Terms ○ Private Key cryptosystems ○ Public key cryptosystems ○ Data Encryption Standards ○ Digital Signature • Access Control • Firewalls • Intrusion Detection and Prevention Systems • Authentication 	
5	<p>Security at Different Layers</p> <ul style="list-style-type: none"> • Physical Security • Software Security • Network Security • Web Security • Advanced Security Issues 	
6	<p>Risk Management</p> <ul style="list-style-type: none"> • Risk management strategies • Disaster recovery plans 	
Textbook and References:	<ol style="list-style-type: none"> 1. Whitman, Michael and Mattford, Herbert (2015). Principles of Information Security (5th edition), Course Technology, Cengage Learning 2. Fundamentals of Information Systems Security, 2016, by David Kim and Michael G. Solomon 3. Information Assurance Handbook: Effective Computer Security and Risk Management Strategies, 2014, by Corey Schou and Steven Hernandez 4. Information Assurance: Managing Organizational IT Security Risks, 2002, by Joseph Boyce Employee of the Department of Defense and Daniel Jennings Information Systems Security Manager European Command (EUCOM) 5. Cyber security: The Essential Body Of Knowledge, , 2011, by Dan Shoemaker and Wm. Arthur Conklin 	
Teaching Strategy	<p>Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.</p>	
Assessment:	<p>The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination</p>	

3.1.23 IT463 Foundations of Data Analytics

Prerequisites:	MT361	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV Semester I	
Description:	The aim of this course is to allow students to understand the foundational skills in data analytics, including preparing and working with data; abstracting and modelling an analytic question; using tools from statistics, learning and mining to address these questions. Students will study techniques for how to go from raw data to a deeper understanding of the patterns and structures within the data, to support making predictions and decision making. The students will learn how to manage and optimize the analytics value chain, including collecting and extracting the suitable values, selecting the right data processing processes, integrating the data from various resources,	
Learning Outcomes:	<p>By the end of the module, students will should be able to:</p> <ul style="list-style-type: none"> • Understand the principles and purposes of data analytics, and articulate the different dimensions of the area. • Work with and manipulate a data set to extract statistics and features, coping with missing and dirty data. • Apply basic data mining machine learning techniques to build a classifier or regression model, and predict values for new examples. • Identify issues with scaling analytics to large data sets, and use appropriate techniques (NoSQL systems, data structures) to scale up the computation. • Appreciate the need for privacy, identify privacy risks in releasing information, and design techniques to mediate these risks. 	
Course Content		
Unit	Topic	Week
1	Introduction <ul style="list-style-type: none"> • Examples in R • Data-Driven or Inductive Approach 	1-3
2	Representing Observations <ul style="list-style-type: none"> • Feature Extraction, Selection, and Construction • Examples 	4-6
3	Summarizing Univariate and Bivariate Data <ul style="list-style-type: none"> • Summarizing Univariate Data • Summarizing Bivariate Data 	7-10
Mid Semester Week		8
4	Summarizing Multivariate Data <ul style="list-style-type: none"> • Matrix of Scatter Plots • Principal Component Analysis • Clustering 	11-12
5	Linear Models <ul style="list-style-type: none"> • Linear Regression • Analysis of Variance • Analysis of Covariance • Mixed Effects Models • Generalized Linear Models • Regularization 	12-14

Textbook and References:	<ol style="list-style-type: none"> 1. Data Analytics: A Practical Guide To Data Analytics For Business, Beginner To Expert(Data Analytics, Prescriptive Analytics, Statistics, Big Data, Intelligence, Master Data, Data Science, Data Mining), 2017, by James Fahl 2. Data Management: Foundations of Data Analytics, 2013, by Richard Watson 3. Statistical Data Analytics: Foundations for Data Mining, Informatics, and Knowledge Discovery, 2015, by Walter W. Piegorsch
Particular Resource Req.:	R programming environment, Python development environment
Teaching Strategy:	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination

3.1.24 IT474 Special Topics in IT

Prerequisites:	None
Credit Hours:	3 (5 ECTS)
Course Schedule:	Academic Year IV Semester II
Description:	The purpose of this course is to give students the opportunity to cover issues and current trends that might have not been covered in the courses provided as core or elective courses. The instructor has the responsibility of introducing current topics relevant for the program. Students are provided with a list of papers published on accredited journals or conference proceeding to choose from. Each student will choose papers, critically evaluate, prepare and submit a well-written report followed by oral presentation findings and critics.
Learning Outcomes:	On successful completion of this course, students will be able to: <ul style="list-style-type: none"> ● Get professional updates in the field of information technology ● Get acquainted to the current issues and trends ● Hear state-of-the-art recommendations from expert faculty and guest lecturers on information technology ● Recognize advanced business systems structures and principles.
Course Content	
Topics vary according to the interest of students and instructor. Typical topics include <ul style="list-style-type: none"> ● analysis of business systems, ● trends in cyber security ● Internet of Things ● Big data analysis, etc. 	
Textbook and References:	As suggested by respective instructors
Particular Resource Req.:	Classroom
Teaching Strategy	Lectures conducted by 2-3 professionals, guest lectures, discussion forums, reading assignments
Assessment:	60%: Assignments, readings and presentations. 40%: Final Examination / Written or Oral

3.1.25 IT476 IT Service Management

Prerequisites:	SE421	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester II	
Description:	This course is designed to introduce IT service systems in a variety of enterprise and service industry settings. The IT history, components, and infrastructures will be reviewed. The hot IT service systems in the context of the firm, industry, and economy will be discussed. Course materials cover IT service system concepts, operational strategies, practical experience, and organizational issues. The management of IT service systems will be introduced from the system architectures and service principles, through the case study, towards the better job preparation for IT service system design and operation.	
Learning Outcomes:	<p>After completing the course, students will be able to:</p> <ul style="list-style-type: none"> • Grasp service concepts from the origin and trend of IT industry • Gain an appreciation of the management complexities associated with implementing IT services • Understand operations of successful IT service firms as benchmarks for future management practices • Develop a service mindset along with an understanding of "state of the art" IT service management • Become aware of the service opportunities for enhancing competitiveness • Realize the organizational significance of managing the IT services to achieve internal and external customer satisfaction • Extend knowledge scope from Technique to Management and from IT Engineering to Service Science 	
Course Content		
Unit	Topic	Week
1	Introduction to IT Service management <ul style="list-style-type: none"> • Understanding the value of services • Issues in IT Service Management • IT service management standards, frameworks and best practices, 	1-2
2	Service strategy processes <ul style="list-style-type: none"> • Service portfolio management • Demand management • Business relationship management 	3-4
3	Service design processes <ul style="list-style-type: none"> • Service design overview and processes 	5
4	Service transition processes <ul style="list-style-type: none"> • Transition planning and support • Change management • Service asset and configuration management • Release and deployment management • Knowledge management 	6-7
Mid Semester Week		8
5	Service operation and processes <ul style="list-style-type: none"> • Event management • Incident management 	9-11

	<ul style="list-style-type: none"> • Request fulfilment • Problem management • Access management 	
6	<p>Service operation functions</p> <ul style="list-style-type: none"> • Service desk • Technical management • Application management • IT operations management • Continual Service Improvement Process 	12-14
Textbook and References:	<ol style="list-style-type: none"> 1. IT Service Management, 2016, by John Sansbury, Ernest Brewster, Aidan Lawes, Richard Griffiths 2. Implementing Itsm: From Silos to Services: Transforming the It Organization to an It Service Management Valued Partner, , 2014, by Randy a. Steinberg 3. Foundations of IT Service Management with ITIL 2011: ITIL Foundations Course in a Book, 2011, by Brady Orand and Julie Villarreal 4. Service Management: Operations, Strategy, Information Technology, 2010, by James A. Fitzsimmons 5. Service Modelling: Principles and Applications, 2006, by Vilho Räisänen 	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.26 IT481 Cloud Computing and Data Centre Management

Prerequisites:	IT381	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester II	
Description:	This course provides basic concepts of cloud computing and data centre management: a hands-on comprehensive study of Cloud computing and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS), awareness of data center requirements, design and management technologies and methodologies. The course also gives insight on data center operational characteristics and requirements as well as industry best practice principles for achieving effective operational management.	
Learning Outcomes:	<p>Upon completion of the course, students will have</p> <ul style="list-style-type: none"> ● Knowledge of the main concepts, key technologies, strengths, and limitations of cloud computing ● Exploit the benefits of the different cloud service models: SaaS, PaaS, and IaaS ● explain the core issues of cloud computing such as security, privacy, and interoperability. ● Have a broad overview of data centre technology and the interactions and interdependencies of data centre components ● knowledge in data centre infrastructure, operations and best practices. 	
Course Content		
Unit	Topic	Week
1	Cloud Computing Overview <ul style="list-style-type: none"> ● Cloud Computing definition and characteristics ● Cloud Computing and SOA ● Enterprise Cloud drivers and adoption trends ● Cloud service models/types (public, private, hybrid, and community clouds) ● Cloud deployment models ● Cloud reference architectures 	1-3
2	Cloud Computing Services <ul style="list-style-type: none"> ● Infrastructure as a service (IaaS) ● Platform as a service (PaaS) ● Software as a Service (SaaS) ● Business Process as a Service (BPaaS) 	4-7
Mid Semester Week		8
3	Cloud Security <ul style="list-style-type: none"> ● Cloud security challenges ● Cloud security approaches: ● Design of secured cloud architecture 	9-10
4	Planning Cloud transformations <ul style="list-style-type: none"> ● suitability assessment, ● financial assessment and platform selection, ● roadmap definition 	11-12
5	Data Centre Management <ul style="list-style-type: none"> ● Overview of Data Centres 	13-14

	<ul style="list-style-type: none"> • Components of Data Centre <ul style="list-style-type: none"> ○ Network infrastructure. ... ○ Storage infrastructure. ... ○ Computing resources. ... ○ Network security appliances. ... 	
Textbook and References	<ol style="list-style-type: none"> 1. Cloud Computing: An Introduction, 2017 by R. Chopra 2. Cloud Computing – An Introduction, 2015 by subu sangameswar 3. Handbook of Data Center Management: Second Edition (CRC Press Revivals), 2017, Wayne C. Bradley 4. Cloud Security: Introduction to cloud security and data protection, 2018, by Nate Jenner 5. Data Center Infrastructure & Organization, 2016, by George Haynes 6. Cloud industry publications, online Textbook, and research papers on various topics connected to the various sessions 	
Particular Resource Req.:	Computer lab, visit to data centre and hands on experiment	
Teaching Strategy	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.1.27 IT493 IT Capstone Project I

Prerequisites:	None
Credit Hours:	4 (7 ECTS)
Course Schedule:	Academic Year IV Semester I
Description:	The capstone project allows students to demonstrate their learning using an area of interest as the basis for the project. This could be in an area that they participate to pursue after graduation. Students will work in a team of 3-4 to design, assemble/develop and present a capstone project to an audience to demonstrate personal learning and achievement, and growth in core competencies
Learning Outcomes:	The following are the learning outcomes of the capstone project: <ul style="list-style-type: none"> • Communication: In addition to written documentation of the project, students have the opportunity to develop their oral communication skills by way of providing presentations • Lifelong learning: Students will perform independent learning of new technologies and concepts • Modern Tools and Techniques: The completion of the project will enable students to select, and learn the necessary tools and techniques that are needed to complete the project.
Teaching Strategy:	Projects are carried out with continuous interaction between candidates and their designated supervisors.
Assessment:	The project is assessed through evaluation of the written report and the oral defence made by each candidate. An examination board set up for a project makes the assessment for each individual candidate.

3.1.28 IT494 IT Capstone Project II

Prerequisites:	IT493
Credit Hours:	4 (7 ECTS)
Course Schedule:	Academic Year IV Semester II
Description:	This course is a continuation from capstone project I of 1 st semester.
Learning Outcomes:	The following are the learning outcomes of the capstone project: <ul style="list-style-type: none"> • Communication: In addition to written documentation of the project, students have the opportunity to develop their oral communication skills by way of providing presentations • Lifelong learning: Students will perform independent learning of new technologies and concepts • Modern Tools and Techniques: The completion of the project will enable students to select, and learn the necessary tools and techniques that are needed to complete the project.
Teaching Strategy:	Projects are carried out with continuous interaction between candidates and their designated supervisors.
Assessment:	The project is assessed through evaluation of the written report and the oral defence made by each candidate. An examination board set up for a project makes the assessment for each individual candidate.

3.1.29 MT161 Discrete Mathematics

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester I	
Description:	This is an introductory course in discrete mathematics. The goal of this course is to introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering. The course teaches students techniques in how to think logically and mathematically and apply these techniques in solving problems. Students will learn Propositional logic and set theory, predicate Logic and quantification; the real and complex number systems; methods of proof (mathematical induction); relations and functions, sequences and series, arithmetic algorithms, computational complexity of algorithms and analytic geometry.	
Learning Outcomes:	<p>At the end of the course, students will be able to</p> <ul style="list-style-type: none"> ● Understand and construct mathematical arguments ● Apply logical reasoning to solve a variety of problems ● Develop recursive algorithms based on mathematical induction ● Know basic properties of relations ● Understand basic concepts in formal languages and computability ● Apply knowledge about discrete mathematics in problem solving ● Use and interpret mathematically correct terminology and notation. ● Formulate a correct proof of a universally quantified statement. ● Propose a counter example to demonstrate that a statement is false. ● Know essential concepts in graph theory and related algorithms 	
Course Content		
Unit	Topics	Week
1	The logic of compound statements <ul style="list-style-type: none"> ● Logical form and logical equivalence ● Conditional statements ● Validity and invalid arguments ● Application: Digital Logic Circuits ● Number Systems and Circuits for Addition, 	1-2
2	The logic of quantified statements <ul style="list-style-type: none"> ● Predicates and Quantified Statements I ● Predicates and Quantified Statements II ● Statements with Multiple Quantifiers ● Arguments with Quantified Statements 	3-4
3	Theory and concept of sets <ul style="list-style-type: none"> ● The language of sets ● Definitions and the element Method of proof ● Properties of sets ● Disproof's, Algebraic Proofs, and Boolean Algebras ● Boolean Algebras, Russell's Paradox, and the Halting Problem, 	5-6
4	Number theory & Methods of Proof,	7

	<ul style="list-style-type: none"> • Direct proofs and counter examples • Indirect Argument: -contradiction and contraposition • Indirect Argument Two classical theorems • Algorithms 	
Mid Semester Week		8
5	Relations and Functions <ul style="list-style-type: none"> • Relations on Sets • Equivalence Relations • Partial Order Relations • Functions Defined on General Sets 	9
6	Exponential and Logarithmic Functions <ul style="list-style-type: none"> ▪ Exponents and radicals • Exponential functions and their graphs • Logarithmic functions and their graphs 	10
7	Sequences, mathematical induction, and recursion <ul style="list-style-type: none"> ▪ Sequences - Summation Notation, Product Notation, ▪ Properties of Summations and Products, Factorial and “n Choose r” Notation, Sequences in Computer Programming, ▪ Application: Algorithm to Convert from Base 10 to Base 2 Using Repeated Division by 2 	11
8	Trigonometry <ul style="list-style-type: none"> ▪ concept of functions ▪ combinations of functions ▪ Compositions of functions ▪ The trigonometric function ▪ Graph of the Trigonometric Functions ▪ Trigonometric inequalities and Equations ▪ Solving a Plane Triangle ▪ Solving any Triangle 	12-14
Textbook and References	The textbook for the course is Discrete Mathematics and its Applications, by Kenneth H. Rosen (McGraw-Hill, Inc., New York, 2018. (Or earlier editions) References: Discrete Mathematics with Applications by Susanna S. Epp, 2010.	
Particular Resource Req.:	None	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial sessions, prepares cases, reading assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 30%: mid term exam, 40%: Final Examination.	

3.1.30 MT164 Linear Algebra

Prerequisites:	MT161	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester II	
Description:	<p>Linear algebra is the study of linear systems of equations, vector spaces, and linear transformations. Solving systems of linear equations is a basic tool of many mathematical procedures used for solving problems in science and engineering. In this course, students will concentrate on the mathematical theory and methods of linear algebra. Topics include systems of linear equations quadratic equations, functions, matrices and matrix algebra, inverse matrices; determinants and permutations; real n-dimensional vector spaces, abstract vector spaces and their axioms, linear transformations; inner products (dot products), orthogonality, cross products, and their geometric applications; subspaces, linear independence, bases for vector spaces, dimension, matrix rank; eigenvectors, eigenvalues, matrix diagonalization. Some applications of linear algebra will be discussed, such as economics, accounting, computer graphics, Kirchoff's laws, linear regression (least squares), Fourier series, or differential equations.</p>	
Learning Outcomes:	<p>Upon completion of the course, students will</p> <ul style="list-style-type: none"> ● Have good understanding of the concepts and methods of linear algebra, ● become competent in solving linear equations, performing matrix algebra, calculating determinants, and finding eigenvalues and eigenvectors. ● understand a matrix as a linear transformation relative to a basis of a vector space ● understand the concept of orthogonality of vectors and its use in projecting vectors into subspaces ● learn how to solve over constrained systems using the method of least squares ● connect linear algebra to other fields both within and without mathematics. ● develop abstract and critical reasoning by studying logical proofs and the axiomatic method as applied to linear algebra. 	
Course Content		
Unit	Topics	Week
1	Complex numbers <ul style="list-style-type: none"> ● The set of complex numbers ● The complex plane ● De Moiré's theorem, powers and Roots 	1
2	Vectors Space <ul style="list-style-type: none"> ● Definition of points in n-space ● Vectors and Geometry in two and three space dimensions ● Algebraic properties ● Dot Products and the norm of a vector ● Cross products and their geometric applications. 	2-4

	<ul style="list-style-type: none"> • Important inequalities • Vector Spaces, Subspaces and vector Space axioms • Independence and orthogonal Vectors and Subspaces 	
3	<p>Matrices</p> <ul style="list-style-type: none"> • Definition of a matrix • Algebra of matrices • Types of matrices: square, identity, scalar, diagonal, triangular, symmetric, and skew symmetric matrices • Elementary row and column operations • Row reduced echelon form of a matrix • Rank of a matrix using elementary row/column operations • System of linear equations 	5-7
Mid Semester Week		8
4	<p>Determinants</p> <ul style="list-style-type: none"> • Definition of a determinant • Properties of determents • Adjoint and inverse of a matrix • Cramer's rule for solving system of linear equations (homogenous and non-homogenous) • The rank of a matrix by sub determinants • Determinant and volume • Eigenvalues and eigenvectors of a matrix • Diagonalization of a symmetric matrix 	9-11
5	<p>Linear Transformation</p> <ul style="list-style-type: none"> • Definition of linear transformations and examples • The rank and nullity of a linear transformation and examples • Algebra of linear transformations • Matrix representation of a linear transformation • Eigen values and eigenvectors of a linear transformation • Eigen space of a linear transformation 	12-14
Textbook and References	<p>Textbook</p> <ol style="list-style-type: none"> 1. Linear Algebra and Its Applications (5th Edition), 2015, by David C. Lay and Steven R. Lay 2. Introduction to Linear Algebra, Fifth Edition, 2016 by Gilbert Strang 	
Resource Req.:	None	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial sessions, prepares cases, assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 30%: mid term exam, and 40%: Final Examination.	

3.1.31 MT261 Calculus

Prerequisites:	MT161	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester I	
Description:	This course is designed to develop the topics of differential and integral calculus. Emphasis is placed on limits, continuity, derivatives and integrals of algebraic and transcendental functions of one variable. Rules of differentiation. Higher order derivatives. Chain rule. Related rates. Rolle's and the mean value theorem. Critical Points. Asymptotes. Curve sketching. Integrals. Fundamental Theorem. Techniques of integration. Definite integrals. Application to geometry and science. Indeterminate forms. L'Hospital's Rule. Improper integrals. Infinite series. Geometric series. Power series. Taylor series and binomial series.	
Learning Outcomes:	<p>Upon completion of the course, students will be able to</p> <ul style="list-style-type: none"> • Apply the definition of limit to evaluate limits by multiple methods and use it to derive the definition and rules for differentiation and integration. • Use derivatives to analyze and graph algebraic and transcendental functions. • Select and apply appropriate models and differentiation techniques to solve problems involving algebraic and transcendental functions; • Apply the definition of indefinite integral to solve basic differential equations. • Apply the definition of definite integral to evaluate basic integrals. • Use the fundamental theorem of calculus to evaluate integrals involving algebraic and transcendental functions. • select and use appropriate models and techniques for finding solutions to derivative-related problems. 	
Course Content		
Unit	Topics	Week
1	Limits & Continuity <ul style="list-style-type: none"> • Introduction to the limit concept • Properties of limits • Limits and infinity • Continuity • The intermediate value theorem (IVT) and its applications 	1-3
2	Differentiations <ul style="list-style-type: none"> • Definitions of derivative • Tangent and normal lines • Properties of derivative • Derivative of different functions (polynomial, rational, trigonometric, exponential, logarithmic and hyperbolic functions) • The chain rule and parametric equations • Higher order derivatives • Implicit Differentiation • Extreme Values of Functions Rolle's Theorem and The Mean Value Theorem and their applications	4-7

3	Applications of Derivatives <ul style="list-style-type: none"> • Rolle's Theorem and The Mean Value Theorem and their applications • Monotonic Functions and the First and second derivative test • Applications to extreme values and related rates • Graph sketching and Tangent line approximation and the differentials Indeterminate Forms and L'Hôpital's Rule	7-10
Midsemester Week		8
4	Ant derivatives <ul style="list-style-type: none"> • Indefinite integrals and their properties • Partitions, upper sum, lower sum and • Riemann sums • The Definite Integral • The fundamental Theorem of Calculus 	11-12
5	Ant derivatives <ul style="list-style-type: none"> • Indefinite integrals and their properties • Partitions, upper sum, lower sum and • Riemann sums • The Definite Integral • The fundamental Theorem of Calculus 	13-14
Textbook and References:	<ol style="list-style-type: none"> 1. R. Ellis and D. Gluck, Calculus with Analytic Geometry, 3rd Edition 2. H. Anton, Calculus With Analytic Geometry, 5th Edition 3. Stewart, James. Calculus: Early Transcendentals. 8th ed. Brooks/Cole, Cengage Learning 2012 or later 4. Calculus 1 - Differentiation and Integration (Hamilton Education Guides Book 5), 2018 by Dan Hamilton 	
Particular Resource Req.:	Graphic calculator	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial sessions, prepares cases, assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 30%: mid term exam, and 40%: Final Examination.	

3.1.32 MT266 Boolean Algebra

Prerequisites:	MT164
Credit Hours:	3 (ECTS)
Course Schedule:	Academic Year II Semester II
Description:	This course covers the following topics: algebra of sets, basic boolean functions, Boolean Expressions and Truth Tables, digital logic gates, minterm and maxterm expansions, the basic theorems of boolean algebra, simplifying boolean function with karnaugh maps. Relay circuits and control problem, circuits for arithmetic competition, probability in finite sample space.
Learning Outcomes:	On completing this course, students will be able to <ul style="list-style-type: none"> ● prove a number of useful basic theorems from given Boolean axioms; ● simplify and complement Boolean expressions; ● define the fundamental logic operations AND, OR, Invert; ● relate Boolean expressions to truth tables and logic diagrams. ● Use truth tables and laws of identity, distributive, commutative, and domination. ● Simplify and prove Boolean expressions ● Compute sum of products and product of sum expansions. ● Convert Boolean expressions to logic gates and vice-versa.

Course Content		
Unit	Topics	Week
1	Algebra of Sets <ul style="list-style-type: none"> ● Introduction ● Elements and Sets ● Combination of sets ● Venn Diagram ● Fundamental Laws ● Expanding, Factoring and Simplifying ● Properties of Sets inclusion ● Conditional Equations ● Solution of Equations ● Number of Elements in a set 	1-3
2	Boolean Algebra <ul style="list-style-type: none"> ● Preliminary Definitions ● Definitions and properties of Boolean Algebra ● Disjunctive normal form ● Conjunctive normal form ● Representation of a Boolean Algebra 	4-5
3	Symbolic Logic and Algebra of Propositions <ul style="list-style-type: none"> ● Propositions and definitions of symbols ● Truth table, Object logic and syntax logic ● Material implication ● Truth sets for propositions ● Quantifiers ● Valid arguments ● Indirect truth ● Functionally complete set of operations 	6-7

Midsemester Week		8
4	Switching Algebra <ul style="list-style-type: none"> • Definition of algebraic symbols • Simplification of circuits • Non-series parallel circuits • Design of circuits from given properties • Symmetric functions and their circuits 	9-10
5	Relay circuits and control problem <ul style="list-style-type: none"> • Basic relay control path • N terminal circuits and the use of transfer contacts • Operate and hold paths • Sequential circuits and sequence diagram • Design of sequential relay circuits from given conditions 	11-12
6	Circuits for Arithmetic competition <ul style="list-style-type: none"> • Binary number system • Logical circuit elements • Addition of Binary numbers • Subtraction of Binary numbers • Accumulation • Binary multiplication 	13
7	Probability in Finite sample space <ul style="list-style-type: none"> • Events, sample space, probability • Conditional probability • Some aids to counting • Bernoulli trials, binomial distribution 	14
Textbook:	1. Boolean Algebra and Its Applications (Dover Books on Computer Science), 2010, by J. Eldon Whitesitt 2. Boolean Models and Methods in Mathematics, Computer Science, and Engineering (Encyclopedia of Mathematics and its Applications), 2010, by Peter L. Hammer and Yves Crama	
Particular Resource Req.:	Graphic calculator	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial sessions, prepares cases, assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 30%: mid term exam, 40%: Final Examination	

3.1.33 MT361 Statistical Methods

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III Semester I	
Description:	This is an introductory course in statistics designed to provide students with the basic concepts of data analysis and statistical computing. Topics covered include basic descriptive measures, measures of association, probability theory, confidence intervals, and hypothesis testing. The main objective is to provide students with pragmatic tools for assessing statistical claims and conducting their own statistical analyses.	
Learning Outcomes:	<p>Upon completing this course, students will be able to:</p> <ul style="list-style-type: none"> ● Explain the basic concepts of Statistics; ● Collect and organize statistical data; ● Identify the different types of sampling techniques; ● Analyse data and make valid conclusions based on the results; ● Understand the concepts of central tendency, variation, probability theory and distributions; ● Know the various types of parameter estimation and hypothesis tests 	
Course Content		
Unit	Topics	Week
1	Statistics and Scientific Methods <ul style="list-style-type: none"> ● Why study statistics ● Application of statistics 	1
2	Collecting Data <ul style="list-style-type: none"> ● Observational studies ● Sampling design for surveys ● Experimental studies ● Design for experimental studies 	2-3
3	Data Description <ul style="list-style-type: none"> ● Describing data on a single variable graphical method ● Describing data on a single variable measure of variability ● Summarizing data for more than one variable ● Graphing and Correlation 	4-7
Mid Semester Week		8
4	Probability and probability distribution <ul style="list-style-type: none"> ● Elementary probability rules ● Conditional probability and independence ● Baye's formula ● Variables- Discrete and continuous variables ● Random variables ● Probability distribution for discrete random variables ● Binomial and Poisson distribution ● Continuous probability distribution - Normal distribution ● Radom sampling ● Sampling distribution 	9-11

	<ul style="list-style-type: none"> Evaluating the normal approximation 	
5	<p>Foundations for inference</p> <ul style="list-style-type: none"> Estimation of Variables Confidence intervals Hypothesis testing The central limit theorem Comparing two population means Comparing many means with ANOVA 	12-14
Textbook and References:	<ol style="list-style-type: none"> An Introduction to Statistical Methods and Data Analysis, 2015 by R. Lyman Ott and Micheal T. Longnecker Bundle: An Introduction to Statistical Methods and Data Analysis, 7th + Student Solutions Manual, 2015, by R. Lyman Ott and Micheal T. Longnecker Practical Statistics for Data Scientists: 50 Essential Concepts, 2017, by Peter Bruce and Andrew Bruce Introduction to Probability (Chapman & Hall/CRC Texts in Statistical Science), 2014, by Joseph K. Blitzstein and Jessica Hwang Modern Elementary Statistics, 8th ed., 1992, by Freund, J.E. and G.A. Simon 	
Particular Resource Req.:	Statistical packages, eg. SPSS	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial and lab sessions, prepares cases, assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: mid term exam and 50%: Final Examination.	

3.2 Elective Courses

3.2.1 SE231 Advanced Programming

Prerequisites:	SE132	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester I	
Description:	This course makes revision of software design and architecture and practical agile approaches to usable application software development, it then continues to familiarize students to DevOps and related workflows, Software design patterns, Software development workflow, tools and components, General setup and structure of software projects, Software versioning (version control), Software development and testing, , Behaviour driven development (BDD); User stories and scenarios, Writing / Generating tests from scenarios, Developing features (models, views, controllers) with Test Driven Development techniques; Software version control with Git.	
Learning Outcomes:	<p>At the end of the course, students will be able to</p> <ul style="list-style-type: none"> • Make practical and effective use of agile software development approaches and popular software design patterns • Understand and get hands on experience on test driven software development, including automated testing techniques • write better organized and testable code, produce quality and well tested software products which comply with basic testing standards and high-test coverage • Make practical and effective use of programming tools 	
Course Content		
Unit	Topic	Week
1	Introduction <ul style="list-style-type: none"> • Installing rails • Setting up development environment • Choosing a rails version • Rails and databases • Creating a new application • The architecture of rails application <ul style="list-style-type: none"> • Models, views and controllers • Rails model support 	1-2
2	Introduction to ruby <ul style="list-style-type: none"> • Data types • Logic • Functions • Organizing structures 	3
3	Building a ruby on rails application <ul style="list-style-type: none"> • Incremental development • Creating the application • Validation and unit testing 	4
4	Active record <ul style="list-style-type: none"> • Defining data • Locating and traversing records • Creating, reading, updating and deleting (CRUD) 	5-6

	<ul style="list-style-type: none"> • Transactions 	
5	Action dispatch and controllers <ul style="list-style-type: none"> • Dispatching request to controllers • Processing of requests • Objects and operations 	7
Mid Semester Week		8
6	Action view and Migration <ul style="list-style-type: none"> • Action View <ul style="list-style-type: none"> • Using Templates • Generating Forms • Processing Forms • Uploading Files to Rails Applications • Migrations 	9-12
8	Customizing and extending rails <ul style="list-style-type: none"> • Using Templates • Generating Forms • Processing Forms • Uploading Files to Rails Applications 	13-14
Textbook and References:	1. Practical Object-Oriented Design: An Agile Primer Using Ruby (2nd Edition), 2018, by Sandi Metz 2. https://guides.rubyonrails.org/getting_started.html	
Particular resource req.:	Ruby, Ruby on Rails Framework, Rubymine community edition, Linux operating system preferred, cucumber, Rspec, Git	
Teaching strategy:	Instructor delivers lectures, conducts lab session, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which includes: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.2.2 IT365 Introduction to Artificial Intelligence

Prerequisites:	None
Credit Hours:	3 (5 ECTS)
Course Schedule:	Academic Year III Semester I
Description:	The course explores basic principles, methodologies, techniques, tools and current research topics of Artificial Intelligence. The content includes: history and perspectives of AI, the different types of intelligent agents, goal based agents, search problems, constraint satisfaction problems, adversarial search problems, knowledge based agents, knowledge representation, inference techniques, propositional logic, first order logic, learning agents, inductive learning, neural networks, fuzzy logic, communication and perception, natural language processing, machine learning, computer vision and robotics. Application of these methods to important areas of Artificial Intelligence including development of knowledge-based systems.
Learning Outcomes:	On successful completion of the course students will be able to: <ul style="list-style-type: none"> ● Explain the different perspectives and historical background of Artificial Intelligence ● Describe different types and characteristics of intelligent agents ● Differentiate the different types of searching strategies employed in goal-based agents ● Represent knowledge and implement inference techniques ● Use learning algorithms to create decision tree ● Explain and demonstrate the use of neural network in implementing learning agents

Course Content

Unit	Topics	Week
1	Introduction to Artificial Intelligence (AI) <ul style="list-style-type: none"> ● Introduction to AI ● The Foundations of AI ● History of AI ● Approaches to AI ● State of the Art 	1-2
2	Intelligent Agents <ul style="list-style-type: none"> ● Agents and Environments ● Rationality Vs Omniscience ● Structure of Intelligent Agents ● Agent Types <ul style="list-style-type: none"> ○ Simple reflex agent ○ Model-based reflex agent ○ Goal-based agent ○ Utility-based agent ○ Learning agent 	3-4
3	Problem Solving (Goal Based) Agents <ul style="list-style-type: none"> ● Problem Solving by Searching ● Problem Formulation ● Search Strategies <ul style="list-style-type: none"> ○ Informed Search Strategies ○ Uninformed Search Strategies ○ Local Search Strategies ○ Adversarial Search Strategies 	5-7

	<ul style="list-style-type: none"> • Avoiding Repeated States • Constraint Satisfaction Search 	
Mid Semester Exam		8
4	Knowledge Based Agents <ul style="list-style-type: none"> • Logical Agents • Propositional Logic • Inference in Propositional Logic • Predicate (First-Order)Logic • Inference in First-Order Logic • Knowledge Representation • Knowledge-based Systems 	9-11
5	Learning Agents <ul style="list-style-type: none"> • Factors for designing learning agents • Learning from Examples/Observation • .Knowledge in Learning • Neural Networks 	12-14
Textbook References	and	<ol style="list-style-type: none"> 1. Artificial Intelligence: A Modern Approach. 2015, by Stuart Russell 2. Artificial Intelligence and Machine Learning for Business: A No-Nonsense Guide to Data Driven Technologies, 2018, by Steven Finlay 3. Artificial Intelligence: Modern Approach (4th edition), 2003, by Stuart J. Russell and Peter Norvig. 4. Introduction to Artificial Intelligence (2nd edition), 1985, by Philip C. Jackson,
Particular Req.:	Resource	Computer lab, PROLOG, LISP or PYTHON
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.2.3 IT368 Knowledge Discovery and Data Mining

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	This course discusses basics of the knowledge discovery process, data mining, and provides a basic introduction to data science. It also presents current research in Knowledge Discovery in Databases (KDD) dealing with data integration, mining, and interpretation of patterns in large collections of data. Topics include data warehousing and data pre-processing techniques; data mining techniques for classification, regression, clustering, deviation detection, and association analysis; and evaluation of patterns mined from data. Industrial and scientific applications are discussed.	
Learning Outcomes:	<p>At the end of the course, students will be able to:</p> <ul style="list-style-type: none"> ● Define, describe, and clearly state the objectives of Knowledge Discovery and Data Mining. ● Understand how to implement common data mining techniques to extract patterns, trends, and other useful information from databases. ● Identify relevant data and corresponding databases and data warehouses. ● Mine and discover models, patterns, dependencies that will enable predictions, and make intelligent business and operation decisions, ● Present and document results. 	
Course Content		
Unit	Topics	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> ● Meaning of Data Mining ● Essence of Data Mining ● Relationship between Data Mining, Data Warehousing and On-line Analytical Processing ● Issues in Data Mining ● The KDD/DM Process Model; Prediction vs. Description modeling 	1-2
2	<p>Data warehousing and OLAP Technology for data mining</p> <ul style="list-style-type: none"> ● OLAP technology, attribute-oriented induction ● What is a data warehouse? ● A multidimensional data model ● data cube computation ● Data warehouse architecture ● Data warehouse implementation ● From data warehouse to data mining 	3-4
3	<p>Data preprocessing</p> <ul style="list-style-type: none"> ● Why preprocess data? ● Major Tasks in Data Preprocessing <ul style="list-style-type: none"> ○ Data Exploration ○ Data understanding ○ Data cleaning and reduction ○ Data Integration and Transformation 	5-7

	o Discretization and concept hierarchy generation	
Mid Semester Week		8
4	Classification and prediction <ul style="list-style-type: none"> • Meaning of Classification and prediction • Issues regarding classification and prediction • Classification by decision tree induction • Bayesian classification • Classification by back propagation • Other classification methods • Prediction • Classifier accuracy 	9-11
5	Cluster analysis <ul style="list-style-type: none"> • What is cluster analysis? • Types of data in cluster analysis • Categorization of major clustering methods • Partitioning methods • Hierarchical methods • Density based methods & Outlier analysis 	12-13
6	Mining association rules in large databases <ul style="list-style-type: none"> • Overview of Pattern Discovery • Pattern finding and association rules discovery techniques 	14
Textbook and References	<ol style="list-style-type: none"> 1. Data Science for Business: Predictive Modeling, Data Mining, Data Analytics, Data Warehousing, Data Visualization, Regression Analysis, Database Querying, and Machine Learning for Beginners, 2018, by Herbert Jones 2. Data Mining: Practical Machine Learning Tools and Techniques., 2016, by Ian H. Witten and Eibe Frank 3. Data Mining: The Textbook, 2015, by Charu C. Aggarwal 4. Data Mining: Concepts and Techniques (The Morgan Kaufmann Series in Data Management Systems), 2011, by Jiawei Han and Micheline Kamber 5. Data Warehousing Fundamentals for IT Professionals, 2010 by Paulraj Ponniah 	
Particular Resource Req.:	WEKA Data Mining Tool, Python Programming Environment, R Programming language , Other appropriate data mining and data warehousing tools shall also be selected by the instructor	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.2.4 IT372 Fundamentals of Disaster Recovery and Business Continuity

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	The course covers the concepts, strategies, and implementation of Business Continuity and IT Disaster Recovery. Students will have exposure on how to address risks from cyber-attacks, product tampering, and other intentional and unintentional hazards. The course also covers fundamentals of extensive disaster planning and readiness checklists and developing alternate work and computing sites and emergency facilities. Course also addresses vulnerability assessment techniques and management.	
Learning Outcomes:	<p>By the end of this course, students will be able to</p> <ul style="list-style-type: none"> ● Work successfully in a virtual team. ● Competently use technology vocabulary ● Analyze and interpret data that will help them assess risks from disasters. ● Communicate and defend their risk assessment. ● Assess vulnerability issues for proper planning and management ● Be proficient in developing disaster plans and readiness checklists. ● 	
Course Content		
Unit	Topics	Week
1	<p>Introduction to Disasters</p> <ul style="list-style-type: none"> ● Concepts of disasters ● Disaster terminologies ● Nature of disasters ● Classification of disasters ● Managing disasters 	1
2	<p>Introduction to Business Continuity</p> <ul style="list-style-type: none"> ● Concepts of business continuity ● Objectives of business continuity ● Business resumption plan ● Planning for business continuity 	2-3
3	<p>Disaster Recovery Processing Plans</p> <ul style="list-style-type: none"> ● Process of disaster recovery <ul style="list-style-type: none"> ○ Defining rules ○ Defining processes necessary for disaster recovery ○ Information processing for telecommunication resources ○ Establishing a planning group ○ Risk assessment ○ Performing risk assessment and audits ○ Developing the recovery strategies 	4-5
4	<p>Risk management in disaster recovery</p> <ul style="list-style-type: none"> ● Characterizing risks ● Defining and identifying the sources of risk ● Choosing a risk assessment method ● Communicating risks across the organization ● Developing appropriate responses 	6-7

	<ul style="list-style-type: none"> • Matching the response to the risk • Taking preventive action 	
Mid Semester Week		8
5	<p>Incident response</p> <ul style="list-style-type: none"> • Creating the incident response plan • Defining roles and responsibilities • Responding to incident scenarios • Directing the incident response team • Planning and conducting communications • Connecting with emergency services • Team actions following an incident • Meeting varied user-recovery needs 	9-10
6	<p>Testing and Improving Business Continuity Provisions</p> <ul style="list-style-type: none"> • Rehearsing business continuity arrangements • Testing plans with a step-by-step process • Developing test scenarios and using test results effectively • Considering the impact of testing on the organization • Maintaining and improving the BCM • Ensuring normal developments are accounted for • Leveraging test results to improve organizational practices • Managing organizational change • Facility Protection in Disaster Recovery Plan 	11-12
7	<p>Data and System Recovery</p> <ul style="list-style-type: none"> • Data Recovery • System Recovery and Backup • Incident Response 	13-14
Textbook and References	<ol style="list-style-type: none"> 1. Susan Snedake, Business Continuity and Disaster Recovery Planning for IT Professionals, Syngress, 2014 2. Disaster Recovery, 2015, by Brenda D. Phillips 3. Principles of Incident Response and Disaster Recovery, 2013, by Michael E. Whitman and Herbert J. Mattord 4. The Disaster Recovery Handbook: A Step-by-Step Plan to Ensure Business Continuity and Protect Vital Operations, Facilities, and Assets, 2017, by Michael Wallace and Lawrence Webber 	
Resource requirements:	None	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination. There will also be case studies for discussion.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.2.5 IT475 Information Systems Governance and Audit

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester I	
Description:	The purpose of this course is to expose students to concepts, strategies, and best practices in Information Systems governance, audit and control. Students will acquire the knowledge and skills to evaluate IS governance, and plan and execute audit strategies and controls, based on proven IS audit standards, frameworks, and guidelines. The course also exposes students to the underlying legal, ethical and security issues.	
Learning Outcomes:	<p>Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> ● Get familiar with IS audit strategy in accordance with IS audit standards, guidelines and best practices. ● Effectively communicate emerging issues, potential risks, and audit results to key stakeholders. ● Familiarize themselves with IS governance structure to ensure that IT supports the organization's strategies and objectives. ● Participate in evaluating the organization's IT strategies, policies, standards, procedures, and practices (including risk management and monitoring and assurance) ● identify problematic legal and ethical situations, and recommend a justifiable course of action. 	
Course Content		
Unit	Topics	Week
1	IS Audit Function Knowledge <ul style="list-style-type: none"> ● Information Systems auditing ● Understanding the organization's business ● The IS audit life-cycle ● The IS audit role ● The IS auditor responsibility, authority and accountability ● Code of professional ethics, laws, and regulations 	1-2
2	Risk and Fundamental IS Auditing Concepts <ul style="list-style-type: none"> ● Computer risks and their effects ● Elements of risk analysis ● Risk-based auditing and risk assessment methods ● Reliability of audit evidence ● Need for audit independence ● Responsibilities for fraud detection and prevention 	3-4
3	Standards and guidelines for IS auditing <ul style="list-style-type: none"> ● Code of ethics - ISACA standards/code of ethics ● Internal control standards ● Standards and guidelines specific to a region/country ● IS audit practices and techniques 	5
4	Internal Control Concepts and Knowledge <ul style="list-style-type: none"> ● Internal control types and objectives ● Control classification and procedures ● Developing the audit plan ● Classification and scope of audits ● IS audit quality assurance ● IS Audit reporting techniques 	6-7

Mid Semester Week		8
5	IS Strategic Management <ul style="list-style-type: none"> • Risk and quality control management – • Performance management and reporting: • IT balanced scorecard • Overview of IS Strategic planning • Change management – • Auditing IS strategic planning – • Management Issues (privacy, copyrights, ethical issues, etc.) 	9-10
6	Governance Support Tools, Frameworks, and Techniques <ul style="list-style-type: none"> • COBIT framework • ITIL • Change control • Performance measurement 	11-12
7	Protection of Information Assets <ul style="list-style-type: none"> • Review of information systems security concepts – • IT security - Controls and security audit considerations • Auditing operating systems and network devices • Auditing disaster recovery plans • Audit and Control of IS outsourcing • Corporate governance and ethics 	13-14
Textbook and References	<ol style="list-style-type: none"> 1. Enterprise Governance of Information Technology: Achieving Strategic Alignment and Value, 2009, by Wim Van Grembergen and Steven De Haes 2. Under Control: Governance Across the Enterprise, 2009, by Jacob Lamm and Sumner Blount 	
Particular Resource Req.:	None	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.2.6 IT477 IT Policy and Law

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester I	
Description:	The main topics covered in this course include perspectives of the information society and globalization, the information economy, areas of IT policy, theoretical perspectives and issues of IT policy; institutional approaches to IT policy; theoretical foundation for understanding organizational and managerial problems related to design and implementing IT/IS within organizations of developing countries; contextual factors (organizational structure and strategy, organizational culture, IT occupational culture, national culture, etc.); social and political issues in IT/IS investments; IT/IS governance issues; issues relating to promoting information partnering, outsourcing, electronic marketplace, and capabilities-based competition; IT/IS policy formulation and content; IT/IS evaluation concepts, perspectives, methods and approaches.	
Learning Outcomes:	<p>On successful completion of this course students will be able to:</p> <ul style="list-style-type: none"> ● Get various perspectives of information society and globalization ● Understand institutional approaches to IT policy ● Identify management challenges to implementing information systems ● Formulate It policies and content ● Describe the methods and approaches involved in IT, evaluation. 	
Course Content		
Unit	Topics	Week
1	Overview of Information <ul style="list-style-type: none"> ● Ownership of Information: ● Property Rights ● Intellectual Freedom ● Access to Information ● Public vs. Private Provision of Information 	1-2
2	Information society and globalization <ul style="list-style-type: none"> ● Definitions of the information society ● Freedom of information ● Software and patents ● Privacy and security 	3-4
3	Introduction to Technology and Policy <ul style="list-style-type: none"> ● Theory of policy making ● Nature of IT policy ● IT policy and its components ● Rationale for IT Policy development ● The Heart of Policy Arguments - Equity, Efficiency, Liberty, Security ● Portraying IT Policy Problems ● Policy Strategy and Instruments 	5-7
Mid Semester Week		8
4	The IT policy development process <ul style="list-style-type: none"> ● Policy Areas ● Actors in the policy process 	9-10

	<ul style="list-style-type: none"> • Consideration of legal issues 	
5	Adoption and implementation of IT Policy <ul style="list-style-type: none"> • Challenges • Success factors • Social networking and antisocial conduct 	11
6	IT Laws <ul style="list-style-type: none"> • Importance of IT Law • Copyright in the digital environment • Data Protection Laws • Social media 	12
7	Current Issues in Technology and Policy: <ul style="list-style-type: none"> • Environmental Policy Challenges • Equity and Efficiency • Security and Liberty 	13-14
Textbook and References	1. IT Governance: Policies and Procedures, 2016, by Michael Webber and Larry Webber Computer & IT Policies and Procedures Manual, 2014 by Bizmanualz 2. Information Security Policies, Procedures, and Standards: A Practitioner's Reference, 2016, by Douglas J. Landoll	
Particular Resource Req.:	None	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.2.7 IT479 Management Information Systems

Prerequisites:	IT107	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year IV	
	Semester I	
Description:	This course deals with the nature of information as an organizational resource; its significance in decision making and management; information requirements at different levels and functional areas of management; identification and source of information required; management of information system; development of information system; application of information and knowledge management. Common business applications related to management such as Financial Information Systems, Marketing Information Systems, Manufacturing and Production Information Systems, Human Resource Information Systems, Managerial Decision Support Systems will also be discussed.	
Learning Outcomes:	<p>The course enables students to:</p> <ul style="list-style-type: none"> ● Explain the importance of MIS ● Describe the evolution & characteristics of the information age ● Understand and recognize the relationship between information and decision making, ● Know significance of information and information systems as basic resources from managerial perspective in decision-making. ● Appreciate the ability and skills to identify their information needs, source and to utilize the information efficiently and effectively. 	
Course Content		
Unit	Topics	Week
1	Business management concepts <ul style="list-style-type: none"> ● Basic concepts and tools for business management ● Developing competency in Business Management ● Factors for efficient strategic management ● Ethics in Business Management 	1-2
2	Foundational Concepts In MIS <ul style="list-style-type: none"> ● Introduction ● Business and Management Functions ● The Information Needs and Sources of Managers ● A Framework for Information Systems ● Business Systems (e-business, e-commerce ...) ● eBusiness value creation for management 	3-4
3	IT Leadership and IS Strategic Planning <ul style="list-style-type: none"> ● IS Strategy and Effects of IT on Competition ● Re-engineering Work Processes for IT application ● Role of Internet and emerging technologies ● IT enabled services ● Seamless organizations, Virtual corporations ● Web enabled computing as a strategic tool ● Outsourcing as a strategic alternative. ● International Information Systems 	5-6
4	Securing Information Systems <ul style="list-style-type: none"> ● Information Infrastructure ● Legal Issues and National Information Infrastructure. 	7

	<ul style="list-style-type: none"> • Factors contributing towards the IS security threats • Technologies and Tools for protecting Information Resources 	
Mid Semester Week		8
5	<p>Common Business Applications of Information Technology</p> <ul style="list-style-type: none"> • Financial Information Systems • Marketing Information Systems • Manufacturing and Production Information System • Human Resource Information Systems • Managerial Decision Support Systems • Transaction Processing System (TPS) 	9-11
6	<p>Knowledge Management (KM)</p> <ul style="list-style-type: none"> • Introduction to knowledge management • Organizational Culture and Knowledge Management • KM Tools and Technologies 	12-14
Textbook and References	<ol style="list-style-type: none"> 1. James A. O'Brien, 2004, Management Information Systems, McGraw-Hill Irwin, 2. Bowman, B, G.B. ,and J.C.Wetherbe, July-1980, Modelling for MIS, 3. Bowman, B,G.B.Davis and J.C., (Feb,1983), Three stages of Model of MIS Planning Information and Management, 4. Naevena and Amitabh, (2003), Management Information System, Cyber tech publications. 5. Nolan Richard, (July-August,1982), Managing Information Systems by Committee, Harvard Business Review 	
Particular Resource Req.:	None	
Teaching Strategy	Instructor delivers lectures, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.3 Support Courses

3.3.1 SP111 College English I

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester I	
Description:	<p>This course is intended to develop and improve students' language competence. It is also aimed at developing students' communicative abilities in English which will help students to develop their communicative skills and overall language competence in English. Generally, this course will cover the specific language aspects described below. Developing basic functions of English language skills: reading (scanning, skimming, reading for details, summarizing, understanding the structure of a text); listening (listening for the gist, listening for details, recognizing discourse markers, noticing the structure of a lecture, understanding speaker intentions, recognizing signposting, attending and following skills); writing (summarizing a text, writing descriptive texts); speaking (introducing oneself and others, interviewing, discussions, stating and supporting propositions, stating one's opinions, organizing and taking part in a debate, making a persuasive speech, questioning); vocabulary (working out meanings from context, synonyms, antonyms, collocations, definitions); grammar (relative clauses, modals, voice, conditionals, tense, reported speech).</p>	
Learning Outcomes:	<p>Upon completing the course, students will be able to:</p> <ul style="list-style-type: none"> ● Express their ideas in various communicative contexts (in group/ pair discussion, public speaking settings etc.) ● Use various vocabulary learning strategies and techniques ● Write and present reports ● Read various materials and make their own notes ● Identify the structure of oral and written discourses ● Attend their academic work at ease and with clarity. 	
Course Content		
Unit	Topic	week
1	<p>Introductions: Course; Instructor, students, working procedures</p> <ul style="list-style-type: none"> ● Searching about people and events; how to learn about vocabularies; Punctuation Marks: Capitals, Apostrophes, Semicolons, Colons, commas, quotation marks, full-stop and question marks; Introduction to College English; set of demands; Discussion: First impression of College study and the demands; Writing a short description about self-selected topic; Redraft based using comments. <p>Study Skills</p> <ul style="list-style-type: none"> ● Attending lectures, Taking short notes, Improving notes through group interaction; Building vocabulary; language and meaning, Negation and expansion; Articles on study skills; Different reading skills: Scanning, skimming, reading for details, understanding structure of texts; Telling the gist of a lecture; Improving Writing Skills: basic types of writing – Expository, Narrative, Descriptive and Argumentative types 	1-3

2	<p>Health and Fitness</p> <ul style="list-style-type: none"> Article about current situation of COVID 19, Markers of addition and relating; Using components of a word as clues to its meaning; Collocation, context and relationships to topics to learn new words; Relative clauses; defining and non-defining relative clauses; Critical Reading; Public Speaking: Preparing and making short talk about the thematic issue; Producing a fact sheet; writing a transcript for a radio broadcast; Argumentative writing. 	4-5
3	<p>Current Development on Information Technology</p> <ul style="list-style-type: none"> Active Listening: Fighting Challenges like daydreaming, detouring, private planning; Dictionaries for references, word formation and parts of speech; Speech acts and grammar; Critically analysing and appreciating poems / short stories. Reading for details; Adding variety to your speech; brainstorming; Summarizing a talk or text, commenting on academic articles; Writing in direct/ indirect forms 	6-7
Mid Semester Week		8
4	<p>Cultural Values</p> <ul style="list-style-type: none"> Identifying structure of lectures; Follow markers to get main ideas; Learning meaning of words from their origins: Latin or Greek; Using active and passive voices, degrees of frequency; Time clauses; Reading for main Ideas; reading for details; understanding references; Taking part in debate; Summarizing key ideas from a text. writing descriptive Essay 	9-11
5	<p>Current transformations in the World</p> <ul style="list-style-type: none"> Identifying New Developments; reason out for observed changes; Completing vocabulary network; Conditionals: 1,2 and 3; Ways of expressing cause and effect; Looking at the purposes of introduction and conclusions; Speaking to convince listeners; public speaking; Write Argumentative essay 	12-14
Textbook and References:	<ol style="list-style-type: none"> McGraw-Hill Handbook of English Grammar and Usage, 2nd Edition, 2012, by Mark Lester and Larry Beason Basic English Grammar Workbook, Feb 20, 2014, by Betty S. Azar and Stacy A. Hagen Just the Basics of English Grammar: A workbook for the most common writing problems, 2014, by Sheldon Lawrence Ph.D. 	
Teaching Strategy:	<p>Articles for listening exercise of all units need to be selected and organized. Each Unit is finalized with student Reflection and self-assessment which is checked by the instructor. Instructor delivers lectures, prepares discussion sessions with students, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.</p>	
Assessment:	<p>The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.</p>	

3.3.2 SP112 College English II

Prerequisites:	SP111	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester II	
Description:	College English II is a continuation of College English I, and it mainly aims to provide first year College students proficiency with reading, speaking and writing skills that will be of use for the academic work expected from each student in their higher education career and thereafter. It also aims to help students learn vocabularies that are assumed unfamiliar to them. In the grammar part, with the intention of providing explanations, brief notes are given in each unit. The module consists of five units with three supplementary reading at the end of the Module. The supplementary readings are included to support ideas included in the reading passages in units 1-3. Students are advised to read the references or notes put in the box to further learn the grammar topics included in the Module.	
Learning Outcomes:	<p>Upon completing the course, students will be able to:</p> <ul style="list-style-type: none"> ● Identify different components of ‘life skills’ so that they can actively apply them in life; ● Understand how scientific investigation can be carried out; ● Express their ideas in various communicative contexts (in group/ pair discussion, public speaking settings etc.) ● Use various vocabulary learning strategies and techniques ● Use the future tense forms, in their speech and writing, when appropriate. ● Become aware of the environmental problems and how they can be resolved; ● Determine to participate in environmental protection activities; ● Develop their speaking, listening, reading and writing abilities; ● Use modal verbs, direct and indirect speech in academic discussions and academic writing. ● Be aware of the importance of indigenous knowledge and cultural heritage; ● Write and present reports 	
Course Content		
Unit	Topic	Week
1	<p>Life Skills</p> <ul style="list-style-type: none"> ● Reading Passages preceded and followed by students exercises to be done outside class; discussion of the correct answers in class, making corrections for mistakes done. ● There are notes on types of conclusions in easy writing - the embedded, the retrospective, the reflective and the projective. Examples are given for each type. Students practice writing conclusions of each type. ● Active and passive voices in different tense are exercised followed by writing paragraph, vocabularies in the garment production process and speaking exercise to improve interpersonal skills 	1-3
2	<p>Speculations about the Future of Science</p> <ul style="list-style-type: none"> ● Student Activities: Reading passage on Grassroots attack in bilharzias preceded by pre-reading questions and followed by comprehension and reflective questions to be done by students: classroom discussion on the answers for the questions. Preparing and making short talk about the thematic issue ● There are new vocabularies used in the passage that the readers are expected to comprehend from the context. ● A tabled note on the different forms and functions of the future tense in English is given with work-on. ● Speaking and writing activities conclude the unit student exercises. 	4-5

3	Environmental Protection <ul style="list-style-type: none"> • Pre reading questions followed by a passage on environmental challenges is offered. The grammar part deals with modal verbs: can, could, may, might, must, shall, should, ought to, will, and would. Notes on Modal verbs and their functions are given followed by exercises. There are speaking and writing exercises on debatable environment issues where students are expected to argue raising causes and solutions. • The grammar part deals with identifying quoted and reported speech; changing from direct to indirect speech. 	6-7
Mid Semester Week		8
4	Indigenous Knowledge <ul style="list-style-type: none"> • There is a passage entitled “A Local Pathway to Global Development” written by Benjamin Mkapa, where selected vocabulary are highlighted for study and comprehension exercises are placed amid the passage for students’ reflective activities. • The grammar exercise is on reported speech and direct and indirect speech followed by speaking exercises through group discussion and writing argumentative paragraphs the thematic issues 	9 – 11
6	Cultural Heritage <ul style="list-style-type: none"> • The last unit for the course deals with cultural heritage where students will be guided to identify man-made and natural heritages; be aware of the importance of cultural heritages in national development; develop their speaking, listening, reading and writing abilities; and understand and use relative clauses in their oral and written discourses. • Notes are given for defining and non-defining relative closes followed by speaking and writing exercises. • Additionally, there are supplementary reading materials attached to the module for units 3 to 5 to enrich students understanding about themes of the units. 	12 – 14
Textbook and References:	<ol style="list-style-type: none"> 1. Azar, B. S. (2003). Fundamentals of English grammar. Longman. Eggenchwiler, J., & Biggs, E.D. (2001). Writing: Grammar, Usage, and Style. New York. Hungry Minds. Inc Lucy, J. A., & Lucy, L. A. (Eds.). (1993). 2. Reflexive Language: Reported Speech and Meta pragmatics. Cambridge University Press. 3. Murphy, R. (2012). English Grammar in Use. Ernst Klett Sprachen. Naylor, H., & Murphy, R. (2007). Essential Grammar in Use. Supplementary Exercises. With Answers. Ernst Klett Sprachen 	
Particular Resource Req.:	None	
Teaching Strategy:	Each Unit begins with statements of learning outcomes followed by probing questions to activate student critical thinking. Then reading passages on thematic issues of the unit, vocabularies, grammar and writing exercises follow with intermittent reflective exercises. Each unit is finalized with student Reflection and self assessment which is checked by the instructor. Instructor delivers lectures, prepares discussion sessions with students, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessments which include: 30%: Continuous Assessment, 20% Writing exercises and 50%: Final Examination.	

3.3.3 SP115 Geography of Ethiopia and the Horn

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester I	
Description:	<p>This course intends to familiarize students with the basic geographic concepts particularly in relation to Ethiopia and the Horn of Africa. It is also meant to provide students a sense of place and time (geographic literacy) that are pivotal in producing knowledgeable and competent citizens who are able to comprehend and analyze spatial problems and contribute to their solutions. The course provides an opportunity for the reader to understand the implications of the location, shape and size of Ethiopia, as well as the country's physical and human resources diversity and abundance on its socioeconomic development. Main focuses of the course are: Shape and size of Ethiopia; basic skills of reading maps; physical background and natural resource endowment of Ethiopia and the Horn which includes its geology and mineral resources, topography, climate, drainage and water resources, soil, fauna and flora; demographic characteristics of the country and its implications on economic development; treatment of the various economic activities of Ethiopia and the Horn which include agriculture, manufacturing and the service sectors.</p>	
Learning Outcomes:	<p>Upon completing the course, students will</p> <ul style="list-style-type: none"> ● Have basic familiarity on the location shape and size of Ethiopia and the Horn ● Have basic familiarity on the Topography and Geology of Ethiopia and the Horn ● Be able to identify the rocks and mineral resources of Ethiopia ● Have understanding of Topography of Ethiopia and the horn ● Be familiar with Drainage systems and water resources of Ethiopia and the horn ● Be familiar with the Natural vegetation and wildlife resources of Ethiopia ● Have understanding of the climate of Ethiopia and the Horn ● Have Population of Ethiopia and the horn ● Have basic skills of demographic measurements 	
Course Content		
Unit	Topics	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> ● Geography: Definition, Scope and Themes ● Location, Shape and Size of Ethiopia and the Horn ● Basic Skills of Map Reading 	1-2
2	<p>The Geology of Ethiopia and the Horn</p> <ul style="list-style-type: none"> ● The Geologic Processes: Endogenic and Exogenic Forces ● The Geological Time Scale and Age Dating Techniques ● Geological Processes and the Resulting Landforms of Ethiopia and the Horn ● Rock and Mineral Resources of Ethiopia 	3-4
3	<p>The Topography of Ethiopia And the Horn</p> <ul style="list-style-type: none"> ● The Physiographic Divisions of Ethiopia ● The Impacts of Relief on Biophysical and Socioeconomic Conditions 	5-6

4	Drainage Systems and Water Resource of Ethiopia and The Horn <ul style="list-style-type: none"> • Major Drainage System of Ethiopia • Water Resources: Rivers, Lakes and sub-surface water • Water Resources potentials and Development in Ethiopia 	7
Mid Semester Week		8
5	The Climate of Ethiopia and The Horn <ul style="list-style-type: none"> • Elements and Controls of Weather and Climate • Spatiotemporal Patterns and Distribution of Temperature and Rainfall in Ethiopia • Agro-ecological Zones of Ethiopia • Climate Change/Global Warming: Causes, Consequences and Response Mechanisms 	9-10
6	Soils, Natural Vegetation and Wildlife Resources of Ethiopia And the Horn <ul style="list-style-type: none"> • Ethiopian Soils: Types, Degradation and Conservation • Natural Vegetation of Ethiopia • Wild Life/wild animals in Ethiopia 	11
7	Population of Ethiopia And the Horn <ul style="list-style-type: none"> • Population Data: Uses and Sources • Population Dynamics: Fertility, Mortality and Migration • Population Distribution in Ethiopia • Socio-cultural Aspects of Ethiopian Population: Education, Health and Languages • Settlement Types and Patterns 	12-13
8	Economic Activities in Ethiopia <ul style="list-style-type: none"> • Mining Activity in Ethiopia • Forestry • Fishery • Agriculture in Ethiopia • Manufacturing Industry in Ethiopia • The Service Sector in Ethiopia 	14
Textbook and References:	1. Geography of Ethiopia and the Horn. Compiled by Dr. Tefferi Mekonnen et al. September 2019 (Handout/reference prepared for students of higher learning in Ethiopia)	
Teaching Strategy:	Lectures, reading assignments, discussions with students, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.3.4 SP116 History of Ethiopia and the Horn

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester II	
Description:	<p>In this course students will learn about the role of history in human life and goals of studying history. They will also study the importance of history in nation building and the making of identity in time and space. The course covers the major historical processes in Ethiopia and the Horn from ancient times to 1994. It is also concerned with how the socio-cultural, religious, economic and political experiences of the past are interwoven in the making of contemporary Ethiopia and the Horn. It demonstrates how societies, peoples and the world that we live in have changed over time and its implication for the history of Ethiopia and the Horn. The course emphasizes the social, economic and cultural history of peoples in Ethiopia</p>	
Learning Outcomes:	<p>After completing the course, students will be able to:</p> <ul style="list-style-type: none"> ● get knowledge of the meaning, nature and uses of history. ● Familiarize themselves with Human Evolution and Neolithic Revolution ● trace origin, developments, achievements and effects of states in the region during the ancient period. ● realize the interplay between local developments and foreign influence in the making of the region. ● explicate the role of population movements in shaping modern Ethiopia and the Horn. ● assess developments in Eastern, Central, Southern & Western parts of Ethiopia & the Horn ● discern the move towards modernization and the challenges encountered ● point out legacies of major battles, victories and the roles of patriots ● elaborate the socio-economic and political changes of the post 1941 imperial period 	
Course Content		
Unit	Topics	Week
1	<p>Introduction</p> <ul style="list-style-type: none"> ● Concepts of History: Meaning, Nature and Uses ● Sources & Methods of Historical Study ● Origin and Development of Historiography of Ethiopia and the Horn ● Introducing and Understanding Ethiopia and the Horn 	1-2
2	<p>Peoples and Cultures in Ethiopia and the Horn</p> <ul style="list-style-type: none"> ● Human Evolution ● Neolithic Revolution ● The Peopling of the Region ● Religion and Religious Processes 	3-4
3	<p>Policies, Economy & Socio-Cultural Processes in Ethiopia & the Horn to the End of the 13th Century</p> <ul style="list-style-type: none"> ● Evolution of States ● Ancient Polities ● External Contacts ● Economic Formations: Agriculture, Handicraft, Trade... ● Socio-cultural achievements: Architecture, Writing, Calendar, Numerals... 	5-6

4	Politics, Economy & Socio-Cultural Processes from Late 13 th –the beginning of the 16 th Century <ul style="list-style-type: none"> • “Restoration” of the “Solomonic” Dynasty • Power Struggle, Consolidation, Territorial and Religious Expansion of the Christian Kingdom Israel/ “Falasha...” • Social, Economic and Political Dynamics of Muslim Sultanates • Rivalry between the Christian Kingdom and the Muslim Sultanates • External Relations 	7-9
Midsemester Week		8
5	Politics, Economy & Socio-Cultural Processes from Early 16 th –the End of the 18 th Century <ul style="list-style-type: none"> • Interaction and Conflicts of the Christian Kingdom and the Sultanate of Adal • Foreign Interventions and Religious Controversies • Population Movements of the Afar, Somali and Argobba • Gadaa System and Oromo Population Movement (1522- 1618) • Interaction and Integration across Ethnic and Religious Diversities • Peoples and States in Eastern, Central, Southern and Western Regions • The Period of Gondar (1636-1769) and “Zemene Mesafint/Era of Princes” (1769-1855) 	10-11
6	Internal Interactions and External Relations from the 1800–1941 <ul style="list-style-type: none"> • The Nature of Interactions among peoples and states of Ethiopia and the Horn • The Making of Modern Ethiopian State • Socio-Economic Issues: agriculture, disease & famine, trade, slavery, manufacturing... • External Relations, Challenges and Threats 	12
7	Internal Interactions and External Relations from the 1941–1994 <ul style="list-style-type: none"> • Post 1941 Imperial Period • The Derg Regime (1974-1991) • Historical Developments, 1991-1994 	13-14
Textbook and References	1. History of Ethiopia and the Horn. (Handout/reference prepared for students of higher learning in Ethiopia)	
Teaching Strategy:	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination.	

3.3.5 SP117 Introduction to Logic and Critical Thinking

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year I	
	Semester I	
Description:	This course is designed to acquaint students with the terms, problems, methods, and theories of several different areas within philosophy. It will introduce students to the major topics of philosophy, explores such fundamental issues as metaphysics, epistemology, political philosophy, ethics, and the philosophy of religion. The course aims to improve students' ability to think critically, develop ideas and express these ideas clearly and persuasively in writing. The course is designed to help students develop the abilities and skills of critical thinking and to construct reliable and logically defensible arguments of their own and rationally evaluate the arguments of others.	
Learning Outcomes:	<p>Upon successful completion of this course, students will be able to:</p> <ul style="list-style-type: none"> ● Understand the basic essence and areas of philosophy, and the necessity of learning it; ● Recognize the components and types of arguments; ● Develop the skill to construct and evaluate arguments; ● Understand the relationship between logic and language; ● Recognize the forms of meanings of words and terms; ● Comprehend the types, purposes and techniques of definitions; ● Understand the concept, principles, and criteria of critical thinking; ● Cultivate the habits of critical thinking and develop sensitivity to clear and accurate usage of language; ● Recognize the various forms of formal and informal fallacies; and ● Understand the components, attributes and representations of categorical propositions. 	
Course Content		
Unit	Topics	Week
1	Introducing Philosophy <ul style="list-style-type: none"> ● Meaning and Nature of Philosophy ● Basic Features of Philosophy ● Core Fields of Philosophy ● Metaphysics and Epistemology ● Axiology and Logic ● Importance of Learning Philosophy 	1-3
2	Basic Concepts of Logic <ul style="list-style-type: none"> ● Basic Concepts of Logic: Arguments, Premises and Conclusions ● Techniques of Recognizing Arguments ● Types of Arguments: Deduction and Induction ● Evaluating Arguments 	4-5
3	Logic and Language <ul style="list-style-type: none"> ● Lesson 1: Philosophy of Language: An overview ● Logic and Meaning ● Logic and Definition <ul style="list-style-type: none"> ○ Meaning, Types, and Purposes of Definitions ○ The Meaning of Definition ○ The Types and Purposes of Definitions 	6-7

	<ul style="list-style-type: none"> ○ Techniques of Definition ○ Criteria for Lexical Definitions 	
Mid Semester Week		8
4	<p>Basic Concepts of Critical Thinking</p> <ul style="list-style-type: none"> ● Meaning of Critical Thinking ● Standards of Critical Thinking ● Codes of Intellectual Conduct for Effective Discussion ● Characteristics of Critical Thinking ● Barriers to Critical Thinking ● Benefits of Critical Thinking 	9-10
5	<p>Informal Fallacies</p> <ul style="list-style-type: none"> ● Fallacy in General ● Informal fallacies ● Fallacies of Relevance ● Fallacies of Weak Induction ● Fallacies of Presumption ● Fallacies of Ambiguity and Grammatical Analogy 	11-12
6	<p>Categorical Propositions</p> <ul style="list-style-type: none"> ● General Introduction ● Attributes of Categorical Propositions: Quality, Quantity, and Distribution ● Venn Diagrams and the Modern Square of Opposition ● Evaluating Immediate Inferences: Using Venn Diagrams and Square of Oppositions ● Logical Operations: Conversion, Obversion, and Contraposition 	13-14
Textbook and References:	<ol style="list-style-type: none"> 1. Introduction to Philosophy: Classical and Contemporary Readings, 2015, by John Perry and Michael Bratman 2. A Concise Introduction to Logic, 12th Edition, 2014, Wadsworth, Cengage Learning. by Hurley, Patrick J. 3. Moral Philosophy: a guide to ethical theory, 2006, by Hodder Murray 	
Particular Resource Req.:	None	
Teaching Strategy:	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.3.6 SP211 Social Anthropology

Prerequisites:	None	
Credit Hours:	2 (4 ECTS)	
Course Schedule:	Academic Year II	
	Semester I	
Description:	<p>This course is expected to acquaint students with essential concept of anthropology covering a wide array of questions revolving around our very existence. It covers issues such as what makes human beings similar to each other? How do we differ from one another? What do anthropologist mean when they talk about diversity, multiculturalism, marginalization, inclusion and exclusion? The course enable learners grasp the different ways of being human by dealing with themes such as culture, kinship, marriage, cultural relativism, ethnocentrism, humanity, human origins, cosmologies, race, ethnicity, ethnic relations, ethnic boundaries, marginalization, minorities, local systems of governance, legal pluralism, indigenous knowledge systems, and indigenous practices and development.</p>	
Learning Outcomes:	<p>Upon the successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ● Develop an understanding of the nature of anthropology ● Understand the cultural and biological diversity of humanity and unity in diversity across the world and in Ethiopia; ● Realize the socially constructed nature of identities & social categories such as gender, ethnicity, race and sexuality; ● Explore the various peoples and cultures of Ethiopia; ● Understand the social, cultural, political, religious& economic life of different ethno-linguistic & cultural groups of Ethiopia; ● Understand different forms marginalization and develop skills inclusiveness; ● Know about values, norms and cultural practices that maintain society together; and ● Develop broader views and skills to deal with people from a wide variety of socio-economic and cultural backgrounds. 	
Course Content		
Unit	Topic	Week
1	<p>Introducing Anthropology and its Subject Matter</p> <ul style="list-style-type: none"> ● Definition, Scope and Subject Matter of Anthropology ● Sub-fields of anthropology ● Unique (Basic) Features of Anthropology ● Misconceptions about anthropology ● The Relationship between Anthropology and Other Disciplines ● The Contributions of anthropology 	1-2
2	<p>Human Culture and Ties that Connect</p> <ul style="list-style-type: none"> ● Conceptualizing Culture: What Culture is and What Culture isn't ● Characteristic Features of Culture ● Aspects/Elements of Culture ● Cultural Unity and Variations: Universality, Generality and Particularity of Culture ● Evaluating Cultural Differences: Ethnocentrism, Cultural Relativism and Human Rights ● Culture Change ● Ties That Connect: Marriage, Family and Kinship 	3-4
3	<p>Human Diversity, Culture Areas and Contact in Ethiopia</p> <ul style="list-style-type: none"> ● Human Beings & Being Human: What it is to be human? 	5-7

	<ul style="list-style-type: none"> • Origin of the Modern Human Species: Homo sapiens • The Kinds of Humanity: human physical variation • Human Races: the history of racial typing • The Grand Illusion: Race, turns out, is arbitrary • Why is Everyone Different? Human Cultural Diversity/Variation • Culture area and cultural contact in Ethiopia 	
Midsemester Week		8
4	<p>Marginalized, Minorities, and Vulnerable Groups</p> <ul style="list-style-type: none"> • Definition of concepts • Gender-based marginalization • Marginalized occupational groups • Age-based vulnerability, Religious and ethnic minorities • Human right approaches and inclusiveness: 	9-10
5	<p>Identity, Inter-Ethnic Relations and Multiculturalism in Ethiopia</p> <ul style="list-style-type: none"> • Identity, Ethnicity and Race: Identification and Social Categorization • Conceptualizing Ethnicity –What’s it? • Ethnic Groups and Ethnic Identity • Race –The Social Construction of Racial Identity • Theories of Ethnicity 	11
6	<p>Customary and Local Governance Systems and Peace Making</p> <ul style="list-style-type: none"> • Indigenous and local governance • Intra and inter-ethnic conflict resolution institutions • Inter-ethnic conflict resolution • Women’s role in conflict resolution and peace-making • Legal pluralism 	12-13
7	<p>Indigenous Knowledge Systems (IKS) and Practices</p> <ul style="list-style-type: none"> • Significance of indigenous knowledge • Indigenous knowledge and development • Preservation, Challenges and Limitations of IK 	14
Textbook and References	<ol style="list-style-type: none"> 1. Social Anthropology Student Handbook prepared by Addis Ababa University, 2019 2. Anthropology and Social Theory: Culture, Power, and the Acting Subject (a John Hope Franklin Center Book). 2006 by Sherry B. Ortner 3. Introduction to Social Anthropology. 2016, Joy Hendry. 	
Teaching Strategy:	The teacher or course facilitator who is assigned to deliver is recommended to make use of different active learning methods including: brainstorming, question and answer, group discussion, buzz-group, cross-over, home-works, reading assignments, peer teaching, and seldom active lecturing.	
Assessment:	To assess the progress of student, the instructor/ the course facilitator is expected to employ a continuous assessment technique in the form of quizzes, group and individual assignments, take-home exam, final exam, term paper.	

3.3.7 SP214 General Psychology

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year II	
	Semester II	
Description:	This course introduces students with the fundamental principles of psychology and to the major subjects of psychological inquiry. The course provides an introduction to the concepts and theories of psychology and to their application to real life situations. Topics include history, sensation, perception, consciousness, stress and coping, learning, memory, motivation and emotions. Basic concepts and principles of individual behaviour are examined, particularly those of human development, normal and abnormal behaviour, social psychology, learning, perception, and psychological measurement.	
Learning Outcomes:	<p>Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> ● Describe basic psychological concepts; ● Compare and contrast the major theoretical perspectives in psychology; ● Differentiate between scientific and non-scientific information about human behaviour and mental processes. ● Explain psychological processes involved in sensation, perception, learning, memory, motivation, emotion, states of consciousness and health. ● Analyze the variety of factors affecting sensation, perception, consciousness, learning, memory, motivation, emotion, and health. ● Apply psychological concepts and principles to situations in everyday life. 	
Course Content		
Unit	Topics	Week
1	Essence of Psychology <ul style="list-style-type: none"> ● Definition of Psychology and Related Concepts ● Goals of Psychology ● Historical Background and Major Perspectives in Psychology ● Branches/Sub Fields of Psychology ● Research Methods in Psychology 	1-2
2	Human Development <ul style="list-style-type: none"> ● Basics of Human Development ● Principles of Human Development ● Aspects of Human Development ● Theories of Human Development 	3-4
3	Learning and Theories of Learning <ul style="list-style-type: none"> ● Definition, Characteristics and Principles of Learning ● Factors Influencing Learning ● Theories of Learning and their Applications 	5
4	Memory and Forgetting <ul style="list-style-type: none"> ● Memory ● Forgetting ● Improving Memory 	6
5	Motivation and Emotions	7

	<ul style="list-style-type: none"> • Motivation • Emotions 	
Midsemester Week		8
6	Personality <ul style="list-style-type: none"> • Meaning of Personality • Theories of Personality 	9
7	Psychological Disorders and Treatment Techniques <ul style="list-style-type: none"> • Nature of Psychological Disorders • Causes of Psychological Disorders (Based on Perspectives) • Types of Psychological Disorders • Treatment Techniques 	10-11
8	Introduction to Life Skills <ul style="list-style-type: none"> • Nature and Definition of Life skills • Components and goals of Life Skills • Intra-personal and personal skills • Self-Concept and Self-Awareness • Self-Control and Anger Management • Emotional Intelligence and Managing Emotion • Stress, Coping with Stress and Resilience • Critical and Creative Thinking • Problem Solving and Decision Making 	12-13
9	Social Skills <ul style="list-style-type: none"> • Understanding cultural Diversity • Gender and Social Inclusion • Diversity Management • Interpersonal Communication Skills • Social Influences • Peer Pressure • Assertiveness • Conflict and Conflict Resolution • Team Work • Overcoming Risky Behaviour 	14
Textbook and References:	<ol style="list-style-type: none"> 1. Introduction to Psychology, 2013, by James W. Kalat 2. Introduction to Psychology: Gateways to Mind and Behaviour (MindTap Course List), 2018, by Dennis Coon and John O. Mitterer 3. Social Psychology. 2012, by Baron, R. A. & Branscombe N. R. New Jersey: Pearson Education, Inc. 	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial sessions, prepares reading assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 30%: midterm exam, 40%: Final Examination	

3.3.8 SP216 Moral and Civic Education

Prerequisites:	None	
Credit Hours:	2 (4 ECTS)	
Course Schedule:	Academic Year II	
	Semester II	
Description:	The course introduces learners to the latest debates on ideals and practices in national and moral education. Basic concepts related to national and moral education, such as family, morality and values, social ethics, nation and national identity, patriotism and citizenship, and their practice and development in both the domestic and international contexts will be examined. Through a reflective-inquiry approach, learners will be able to develop a critical understanding of the above concepts and theories.	
Learning Outcomes:	<p>Upon completion of this course, students will be able to:</p> <ul style="list-style-type: none"> ● develop a reflective understanding of the fundamental concepts related to national and moral education, ● demonstrate an active, informed and responsible attitude in participating in the citizenship debates and investigating issues related to national and moral education; ● acquire basic reflective, inquiry and participation skills in taking part in debates and conducting investigations on issues related to national and moral education ● acquire a reflective understanding of the major social institutions and contexts for national and moral learning and education, especially their practice and development. 	
Course Content		
Unit	Topics	Week
1	Understanding Civics and Ethics <ul style="list-style-type: none"> ● Defining Civic, Ethics and Morality ● Ethics and Law ● The importance of moral/civic education 	1-2
2	Approaches to Ethics <ul style="list-style-type: none"> ● Normative Ethics ● Non-normative Ethics 	3-5
3	Ethical decision making and moral judgement <ul style="list-style-type: none"> ● Making ethical decisions and actions ● Morality and Nature ● Individual Morality ● Being Morally and Ethically responsible 	6-7
Mid Semester Week		8
4	State, Government and citizenship <ul style="list-style-type: none"> ● Understanding States ● Rival theories of State ● The role of states ● Understanding Government ● Understanding Citizenship 	9-11
5	Constitution, Democracy and human rights <ul style="list-style-type: none"> ● Constitution and constitutionalism ● Constitutionalism ● Constitutional Experience of Ethiopia pre and post 1931 	12-14

	<ul style="list-style-type: none"> • Democracy and Democratization • Human rights: Concepts and Theories 	
Textbook and References:	<ol style="list-style-type: none"> 1. Sage handbook of citizenship education and democracy. London, Sage. (2008). Arthur, J., Davies, I. and Hahn, C. (Eds.) 2. Moral and Civic Education Student Handbook prepared by Addis Ababa University 	
Particular Resource Req.:	None	
Teaching Strategy:	Instructor delivers lectures, conducts tutorial sessions, prepares reading assignments and problems for group discussion, gives consultation and advises students on assignment solutions, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	Class participation: Participation in inquiries, discussions and debates conducted in the lessons (20%). A group research project with a written report on a national and moral education in Ethiopia (40%); Final Exam (40%)	

3.3.9 SP311 Business Accounting

Prerequisites :	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester I	
Description:	<p>The course has the general objective of introducing students to the basics of accounting and reporting of financial activities of business organizations. It is designed to provide introductory knowledge of accounting principles, concepts, and practices. The course deals with the processes involved in financial statements preparation for service-giving businesses, merchandising businesses, and manufacturing businesses. Topics covered includes the features of accounting information, users of accounting information, nature of financial statements, the double entry system, financial statements preparation process including journals, ledgers, trial balance, adjustments, worksheets, accruals, adjusting and closing entries, and the accounting system. The course provides a foundation for more advanced work in the fields of Accounting and business. All topics are studied in accordance with the provisions of International Financial Reporting Standards (IFRS)</p>	
Learning Outcomes:	<p>Upon the successful completion of this course, the students will be expected to:</p> <ul style="list-style-type: none"> ● Understand the role of Accounting in business and develop an awareness of the accounting profession ● Understand the purpose of the financial accounting function and standard financial accounting practices ● Define and apply accounting terminology, concepts, and principles ● Summarize and apply basic financial accounting terms, concepts, and principles. ● Take a series of transactions through the accounting cycle ● Analyze, record, and report transactions for service, merchandising, and manufacturing businesses. ● Apply accounting principles and control of cash and receivables 	
Course Content		
Unit	Topics	Week
1	<p>The context and purpose of financial reporting</p> <ul style="list-style-type: none"> ● The reason for, and objectives of, financial reporting ● Users' and stakeholders' needs ● The main elements of financial reports ● The regularity frame work ● The qualitative characteristics of financial reporting ● Alternative bases used in the preparation of financial information 	1-2
2	<p>The use of double entry and accounting system</p> <ul style="list-style-type: none"> ● Double entry book keeping space principles including the maintenance of accounting records and source of information ● Ledger accounts, books of prime entry and journals ● Accounting systems and the impact of information technology on financial reporting 	3-5

3	Recording transaction and events <ul style="list-style-type: none"> • Sales and purchase • Cash • Inventory • Tangible non-current assets and orientation • Accruals and pre payments • Receivables and payables • Provisions and contingencies • Capital structure and finance costs 	6-9
Mid Semester Week		8
4	Preparing trial balance <ul style="list-style-type: none"> • Trial balance • Correction of errors • Control accounts and reconciliations • Bank reconciliations • Suspense accounts 	10-12
5	Preparing basic financial statements <ul style="list-style-type: none"> • Statements of financial position • Income statements and statement of comprehensive income • Events affair the reporting period • Accounting for partnership • Statements of cash flows (excluding partnerships) • Incomplete records 	13-14
Textbook and References	<ol style="list-style-type: none"> 1. Fees and warren, Accounting Principles, 16th edition, South Western publishing Company. / Any recent edition/ 2. Smith, Keith and Stephens, Accounting Principles, 3rd edition and above, McGraw Hill book Company.1989 and beyond. 3. Meigs Walter B., Accounting, The Basis for Business Decisions, 6th Ed and above, 1984 and beyond. 4. Niswonger and Fees, Accounting Principles, South Western Publishing Company 10th – 13th Ed. 	
Resource Req.:	None	
Teaching Strategy:	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.3.10 SP312 Entrepreneurship

Prerequisites:	None	
Credit Hours:	3 (5 ECTS)	
Course Schedule:	Academic Year III	
	Semester II	
Description:	<p>This course is designed to introduce students to the concept of sustainable entrepreneurship, a manageable process that can be applied across careers and work settings. It focuses on building entrepreneurial attitudes and behaviours that will lead to creative solution within community and organizational environments. Course topics include the history of entrepreneurship, the role of entrepreneurs in the 21st century global economy, and the identification of entrepreneurial opportunities. The elements of creative problem solving, the development of a business concept/model, the examination of feasibility studies and the social /moral/ethical implication of entrepreneurship will be incorporated. Issues related to starting and financing a new venture are included.</p>	
Learning Outcomes:	<p>Upon successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ● Define entrepreneurship within the context of society; organizations and individuals. ● Distinguish between an entrepreneurial and a conventional approach to management. ● Describe the element of an effective business model/plan. ● Develop a personal framework for managing the ethical dilemmas and social responsibilities facing entrepreneurs. ● Describe the leadership studies of entrepreneurs who have been successful in different sectors (e.g., start-ups, corporations. Community, public sector, etc.). ● Identify traits/characteristics of an entrepreneur/ entrepreneurs as exhibited in behaviour. ● Analyze elements of the entrepreneurial mind set and discuss the implications for functioning as a successful entrepreneur. . 	
Course Content		
Unit	Topics	Week
1	<p>The Nature of Entrepreneurship</p> <ul style="list-style-type: none"> ● Historical Origin of Entrepreneurship ● Definitions of Entrepreneurship and Entrepreneur ● Types of Entrepreneurs ● Role of Entrepreneurs in Economic Development ● Entrepreneurial Competence and Environment ● Creativity, Innovation and Entrepreneurship 	1-2
2	<p>Business Planning</p> <ul style="list-style-type: none"> ● Opportunity Identification and Evaluation ● Business Idea Development ● Business Idea Identification ● Methods for Generating Business Ideas ● Concept of Business Plan ● Business plan Formats 	3-4
	<p>Business Formation</p> <ul style="list-style-type: none"> ● The Concept of Small Business Development ● Forms of Business (A Short Explanation) ● Setting up Small Scale Business (Failure and Success Factors) 	5-7

	<ul style="list-style-type: none"> • Classification of Enterprises in Ethiopian Context • Organizational Structure and Entrepreneurial Team Formation 	
Mid Semester Week		8
	Product/Service Development <ul style="list-style-type: none"> • The Concept of Product/Service Technology • Product/Service Development Process • Legal and Regulatory Frameworks for Entrepreneurs • Intellectual Property Protection/Product/Service Protection • The Intellectual Property System in Ethiopia 	9-10
	Marketing <ul style="list-style-type: none"> • Meaning and Definitions of Marketing • Core Concepts of Marketing • Importance of Marketing • Marketing Philosophies • Marketing Information Systems • The Marketing Mix Strategy • Selling and of Customer Service 	11-12
	Business Financing <ul style="list-style-type: none"> • Financial Requirements • Sources of Financing • Traditional Financing in Ethiopian (Equib/Idir, Etc.) • Crowd Funding • Micro Finances 	13
	Managing Growth and Transition <ul style="list-style-type: none"> • Timmons Model of Entrepreneurship • New Venture Expansion Strategies • Business Ethics and Social Responsibility 	14
Textbook and References	<ol style="list-style-type: none"> 1. Entrepreneurship: Theory, Process, and Practice (MindTap Course List), 2016, by Donald F. Kuratko 2. The Dark Secret of Entrepreneurship: how to be a successful entrepreneur, 2016, by Mohammed Ibrahim 3. Entrepreneurship (Irwin Management), 2016 by Robert D Hisrich and Michael P Peters 4. Entrepreneurship, 2014 by William D. Bygrave and Zacharakis 	
Teaching Strategy:	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

3.3.11 SP411 Inclusiveness

Prerequisites:	None	
Credit Hours:	2 (4 ECTS)	
Course Schedule:	Academic Year IV	
	Semester I	
Description:	This course intends to make students be more sensitive to the people they work with. Students will learn how to assess, understand and address the needs of persons with disabilities and vulnerabilities; and provide relevant support or seek extra support from experts. He/she also learns how to adapt and implement services for an inclusive environment that aims to develop holistic development such as affective, cognitive and psychosocial skills of the population with disabilities and vulnerabilities.	
Learning Outcomes:	<p>Upon successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ● Articulate personal attitudes, biases, and perspectives related to diversity in the workplace ● Identify the needs and potentials of persons with disabilities and vulnerabilities. ● Identify environmental and social barriers that hinder the needs, potentials and full participations, in all aspects of life of persons disabilities and vulnerabilities ● Demonstrate desirable inclusive attitude towards all persons with disabilities and vulnerabilities in full participations ● Apply various assessment strategies for service provisions for evidence-based planning and implementation to meet the needs of persons with disabilities and vulnerabilities ● Adapt environments and services according to the need and potential of the persons with disabilities and vulnerabilities ● identify strategies to manage diversity issues within the workplace ● Determine and select strategies to ensure organizational inclusivity 	
Course Content		
Unit	Topics	Week
1	Understanding Disabilities and Vulnerabilities <ul style="list-style-type: none"> ● Definitions of disability and vulnerability ● Types of disabilities and vulnerabilities ● Causes of disability and vulnerability ● Historical movements from segregation to inclusion ● The effects of attitude on the move towards inclusion 	1-2
2	Concept of Inclusion <ul style="list-style-type: none"> ● Definition of Inclusion ● Principles of Inclusion ● Rationale for Inclusion ● Factors that Influenced Development of Inclusion ● Benefits of Inclusion ● Features of Inclusive Environment 	3-4
3	Identification and Differentiated services <ul style="list-style-type: none"> ● Impact of Disability and Vulnerability on daily life ● Economic Factors and Disability ● Political Factors and Disability 	5-6

	<ul style="list-style-type: none"> • Psychological Factors of Disability • The family and disability • Needs of Persons with Disabilities and Vulnerabilities. • Gender and Disability 	
4	Promoting Inclusive Culture <ul style="list-style-type: none"> • Definition of Inclusive Culture • Dimensions of Inclusive Culture • Recruitment, Training, & Advancement Opportunities • Workplace Accommodations and Accessibility • Building Inclusive • Means of establish inclusive culture • Characteristics of an Inclusive organization 	7-9
Mid Semester Week		8
5	Inclusion for Peace, Democracy and Development <ul style="list-style-type: none"> • Definition of Peace, Democracy and Development • Democratic principles of inclusive practices • Inclusive Education for Development • Respecting diverse needs, culture, values, demands and ideas • Valuing diversity (cultural, ethnic, religion, etc.) 	10-11
6	Legal Framework <ul style="list-style-type: none"> • General Overview of Legal frameworks • Legal Frameworks Regarding Inclusion • The UN Conventions • National Laws and Policy Frameworks 	12
7	Resources Management for Inclusion <ul style="list-style-type: none"> • Provision of Resources (Material, HR, etc) • Accommodations • Organization and Task Completion • Collaborate partnership with stakeholders 	13-14
Textbook and References	<ol style="list-style-type: none"> 1. Inclusiveness student handbook prepared by Addis Ababa University 2. Diversity Consciousness: Opening Our Minds to People, Cultures, and Opportunities” (4th Edition). 2015. by Richard D. Bucher; 3. An Inclusive Academy: Achieving Diversity and Excellence (The MIT Press) . 2018 by Abigail J. Stewart and Virginia Valian. 	
Teaching Strategy:	Instructor delivers lectures, conducts lab sessions, prepares reading assignments and topics for group discussion, prepares projects by discussion with student, gives consultation and advises students on project works and assignments, prepares and evaluates quiz, assignment, midterm and final examination.	
Assessment:	The evaluation shall be based on both formative and summative assessment which include: 30%: Continuous Assessment, 20%: Project and 50%: Final Examination	

4. Resources

The undergraduate program in Information Technology and Systems is well organized in staff and teaching learning facilities. The resources availed shall allow students to be well equipped with current trends and research methodologies that will give them ability to discover and learn advanced issues independently. The general resources required for the program are summarized in the table below:

Resource	Description
Human Resource	<ul style="list-style-type: none">• Four full time Lecturers• Two graduate assistants
Classroom	<ul style="list-style-type: none">• Four class rooms with LCD projector, Whiteboard and Internet connectivity
Computer Lab	<ul style="list-style-type: none">• Two Computer Labs with at least 13 computers, capable of accommodating 25 students at a time
Library	<ul style="list-style-type: none">• Undergraduate library equipped with at least two reference materials (soft or hard copy) for each of the courses proposed in the curriculum
Software	<ul style="list-style-type: none">• All required software are in place per the requirements of each course
Tools and Accessories	<ul style="list-style-type: none">• Network toolkit, consumables (cables, Rj-45 connectors, and other connectors), devices (switch, access point, router, hub etc.)

5. Course Offering Schedule

5.1 Regular Program

Year I Semester I

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP111	College English I	3	5	48	0	0
SP115	Geography of Ethiopia and the Horn	3	5	48	0	0
SP117	Introduction to Logic and Critical Thinking	3	5	48	0	0
MT161	Discrete Mathematics	3	5	48	0	16
IT105	Introduction to ICT	3	5	48	0	0
IT107	Foundations of Information Systems	3	5	32	32	0
Total for the semester		18	30			

Year I Semester II

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP112	College English II	3	5	48	0	0
SP216	Moral and Civic Education	2	4			
SP116	History of Ethiopia and the Horn	3	5	48	0	0
MT164	Linear Algebra	3	5	48	0	16
SE131	Fundamentals of Programming	3	5	48	0	0
IT154	Data Communications and Computer Networks I	3	5	32	32	0
IT146	Database Systems I	3	5	32	32	0
Total for the semester		18	30			

Year II Semester I

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP211	Social Anthropology	2	4	32	0	0
MT261	Calculus	3	5	48	0	16
SE132	Object Oriented Programming	3	5	32	32	0
IT221	Systems Analysis and Design I	3	5	48	0	0
IT155	Data Communications and Computer Networks II	3	5	32	32	0
IT247	Database Systems II	3	5	32	32	0
Total for the semester		17	29			

Year II Semester II

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP214	General Psychology	3	5	48	0	0
SP312	Entrepreneurship	3	5	32	0	0
MT266	Boolean Algebra	3	5	48	0	16
IT222	Systems Analysis and Design II	3	5	48	0	0
SE252	Operating Systems	3	5	32	32	0
IT284	Introduction to Web Technologies	3	5	32	32	0
Total for the semester		17	30			

Year III Semester I

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP311	Business Accounting and Management	3	5	48	0	0
IT325	Software Design and Construction	3	5	32	32	0
SE381	Web Systems and Services	3	5	32	32	0
SE327	Enterprise Systems	3	5	48	0	0
MT361	Statistical Methods	3	5	48	0	16
	Elective I	3	5			
Total for the semester		18	30			

Year III Semester II

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP116	History of Ethiopia and The Horn	3	5	48	0	0
IT328	IT Systems Acquisition and integration	3	5	48	0	0
IT358	Cyber Security and Ethical Hacking	3	5	32	32	0
IT374	IT Needs Assessment and Management	3	5	48	0	0
SE366	Methods for IS Research	3	5	32	32	0
	Elective II	3	5			
Total for the semester		18	30			

Year IV Semester I

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SP411	Inclusiveness	2	4	32	0	0
SE421	Systems Thinking and Systems Approach	3	5	48	0	0
IT471	IT Project Management	3	5	48	0	0
IT481	Cloud Computing and Data Centre Management	3	5	32	32	0
IT463	Foundations of Data Analytics	3	5	32	32	0
IT493	IT Capstone Project I	4	7	64	0	0
Total for the semester		18	31			

Year IV Semester II

Course Code	Course Title	Credit hours	ECTS	Lec. hours	Lab hours	Tutorial hours
SE422	Information Assurance and Systems Security	3	5	48	0	0
IT474	Special Topics in IT	3	5	48	0	0
IT476	IT Service Management	3	5	48	0	0
IT494	IT Capstone Project II	4	7	64	0	0
	Elective III	3	5			
Total for the semester		16	27			

Note: Technical courses that do not require actual lab hours involve mandatory practical course work in real life project setting under supervision of instructors. In such courses, students are expected to use various software tools in the computer lab for their respective projects and assignments.

5.2 Extension Program

Year I Semester I

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP111	College English I	3	5	48	0	0
MT161	Discrete Mathematics	3	5	48	0	16
IT105	Introduction to ICT	3	5	48	0	0
IT107	Foundations of Information Systems	3	5	32	32	0
Total for Semester		12	20			

Year I Semester II

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP112	College English II	3	5	48	0	0
SE131	Fundamentals of Programming	3	5	48	0	0
MT164	Linear Algebra	3	5	48	0	16
SE252	Operating Systems	3	5	32	32	0
Total for Semester		12	20			

Year I Summer

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP115	Geography of Ethiopia and the Horn	3	5	48	0	0
Total for Semester		3	5			

Year II Semester I

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
IT154	Data communication and Computer Networks I	3	5	32	32	0
MT261	Calculus	3	5	48	0	0
IT146	Database Systems I	3	5	48	0	0
SP214	General Psychology	3	5	48	0	0
Total for Semester		12	20			

Year II Semester II

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SE132	Object Oriented Programming	3	5	32	32	0
IT221	System Analysis and Design I	3	5	48	0	0
IT155	Data communication and Computer Networks II	3	5	32	32	0
IT247	Database Systems II	3	5	32	32	0
Total for Semester		12	20			

Year II Summer

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP116	History of Ethiopia and the Horn	3	5	48	0	0
Total for Semester		3	5			

Year III Semester I

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
MT266	Boolean Algebra	3	5	48	0	0
IT284	Introduction to Web Technologies	3	5	32	32	0
MT 361	Statistical Methods	3	5	48	16	0
IT222	Systems Analysis and Design II	3	5	48	0	0
Total for Semester		12	20			

Year III Semester II

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
IT325	Software Design and Construction	3	5	48	0	0
SP312	Entrepreneurship	3	5	48	0	0
SE327	Enterprise Systems	3	5	48	0	0
SE381	Web Systems and Services	3	5	32	32	0
Total for Semester		12	20			

Year III Summer

Course code	Course Title	Credit Hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP117	Introduction to Logic and Critical Thinking	3	5	48	0	0
Total for Semester		3	5			

Year IV Semester I

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
IT374	IT needs Assessment and Management	3	5	48	0	0
IT358	Cyber Security and Ethical Hacking	3	5	32	32	0
SE366	Methods for IS Research	3	5	48	0	0
SP311	Business Accounting	3	5	48	0	16
Total for Semester		12	20			

Year IV Semester II

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP216	Moral and Civic Education	2	4	32	0	0
IT328	IT systems Acquisition and Integration	3	5	48	0	0
SE421	Systems Thinking and Systems Approach	3	5	48	0	0
IT481	Cloud Computing and Data Centre Management	3	5	32	32	0
Total for Semester		11	19			

Year IV Summer

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SP411	Inclusiveness	2	4	32	0	0
Total for Semester		2	8			

Year V Semester I

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
SE422	Information Assurance and Systems Security	3	5	48	0	0
IT471	IT Project Management	3	5	48	0	0
IT463	Foundations of Data Analytics	3	5	32	32	0
	Elective I	3	5			
Total for Semester		12	20			

Year V Semester II

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
IT476	IT Service Management	3	5	48	0	0
IT493	IT Capstone Project I	4	7	64	0	0
	Elective II	3	5	48	0	0
Total for Semester		11	17			

Year V Summer

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
IT474	Special Topics in IT	3	5	48	0	0
Total for Semester		2	4			

Year VI Semester I

Course code	Course Title	Credit hour	ECTS	Lec. hours	Lab hours	Tutorial hours
IT494	IT Capstone Project II	4	7	64	0	0
	Elective III	3	5	48	0	0
Total for Semester		9	17			