

**E.H.E.**  
**EUROPEAN UNIVERSITY**  
**EURAKA SWITZERLAND**



**Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security**

## **1.Introduction**

This documentation constitutes the Programme Outline for the Undergraduate Degree of the Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security of the E.H.E. European University EurAka Switzerland. The programme of studies is aligned with international standards of Undergraduate Higher Education and fulfils the criteria of the process of Harmonisation of Higher Education in Europe accordingly.

The modules are delivered interactively and are based on actual knowledge and research in this pathway. They equally introduce students to essential practice and embed internships.

Objective of this programme of studies is to introduce students to relevant theory and practice with a specific view on contemporary computer science. Therefore, all modules of this course and their content are oriented towards actual and future trends in this computer science and IT industry. That means the right balance between professional roles in organisational functions or in future self-employment. They also own an overarching understanding on how IT organisations function in a competitive environment.

Each individual module is designed to provide in-depth subject knowledge and also contributes to cross-functional understanding. The overall outcome of this programme of studies supports Graduates in their career development through the combination of academic knowledge and essential practice-orientation of highest standards. Emphasis of the programme of studies is Employability Impact.

This programme of studies is considered as relevant, rich and academically valid. Superior professional standards have been embedded accordingly.

Professor Dr Dr Klaus Oestreicher

Fellow of the Higher Education Academy (UK)

Pro Vice-Chancellor International

## **2.Delivery of Teaching and Student Achievement**

The programme of studies can be either delivered as full- or part-time studies. In addition to the formal contact hours students will be expected to engage in additional independent studies during and between the

different modules. These independent studies are more intense, when the programme is taken as part-time studies. Individual and own studies are an essential element of study requirements, which strongly contribute to the successful outcome of the studies. The Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security is especially designed to improve candidates'

- Qualities in effectively and efficiently contributing to organisational progress
- Knowledge on the inter-functional and cross-disciplinary complexities within contemporary challenges
- Capacity to exercise good practice by application of profound standards in the computer science and IT related business
- Intellectual calibre and critical reflection
- Problem-solving skills being essential in and for complex environments
- Own motivation and that of others and through these develop principles for sustainable organisational competitiveness and viability.

## 2.1 General Delivery

These studies can be delivered as full-time or part-time studies. Practice-oriented internships complement teaching and learning.

In addition to formal contact hours students are expected to engage in independent studies, during and after taking the different modules. They are an essential study prerequisite.

The standard period of studies comprises eight (8) semesters.

## 2.2 Attendance

For all its presence studies EurAka University strongly feels that good attendance is necessary on students' part as an important element of successful studies. Consequently, the following requirements operate:

- Students are expected to attend all sessions.
- If a student cannot attend for any genuine reason (e.g. illness), they are expected to inform the module tutor or course leader in due time.
- Persistent non-attendance will require an explanation, in person, initially with the course leader.

## 2.3 General Grading Scheme of the University

Through all modules and the dissertation, a consistent marking scheme applies.

### 2.3.1 Marking Scheme

Grading can be based on theoretical discussion only, but in the case of applied sciences it can also respect pragmatism. I.e., depending on the assessment brief, practice-orientation of an assessment then is of equal

acceptance and value, but that does not mean that submitted work can be without significant theoretical components i.e., all assessments must include sufficient theory and (except examinations) adopt sufficient literature of academic acceptability. The literature has to be academically acknowledged meaning that public sources are not approved.

### 2.3.2 Grading Policies

The possible range of grades consists of:

Obtained Percentage	Value
>91%	High Distinction
81 to 90%	Distinction
71 to 80%	Merit
61 to 70%	Pass with Satisfaction
50 to 60%	Pass
<50%	Fail = Retake of assessment

*Table 1 Grading Policy*

% of Obtained Mark	Grade point	Grade Symbol	Values	Explanation
90.00-100%	4	A+	High Distinction	Showing outstanding achievement
80.00-89.99%	3.83	A	Distinction	
70.00-79.99%	3.67	A-	Merit	show honors achievement of a more higher than average achievement of other students of the class
65.00-69.99%	3.33	B+	Pass with satisfaction/Average	Show satisfactory performance with an average performance
60.00-64.99%	3.00	B		
55.00-59.99%	2.33	C+	Pass	Showing percentage less than the average achievement of all students in the same class
50.00-54.99%	2.00	C		
45.00-49.00%	1.67	D+	Fail	Reset- Students can sit chance exam
40.00-44.99%	1.33	D		
00.00-39.99%	1.00	F	Fail	Retake-Students have to re-register for that exam

*Table 2 Grade Point Table*

### 2.3.3 Retake Regulations

Students, who have failed an assessment and/or module, are admitted to one retake. The maximum mark awarded to retakes is a Pass at 50%.

Should a student fail the re-assessment as well, they will have to repeat the module. During the whole programme of studies

- ❖ Each module can only be repeated once, and

- ❖ It only is possible to repeat three modules in total

Students failing a module twice or three modules in total will not be able to continue their studies to the intended degree. **2.3.4 Moderating Approval of Marks**

To achieve consistent marking and as an implemented and proven control of quality, all assessments are subject to the moderating approval of the Examination Board as explained in the Undergraduate Student Handbook. This process guarantees that students will find an impartial, equal and fair marking process.

### 2.3.5 Student Handbook

Further essential elements of importance for this programme of studies are regulated and explained in the Undergraduate Student Handbook. Students are advised to read these carefully as a binding regulating part of the course's structure.

### 2.4 Award

Students, who have passed all modules and the dissertation successfully, the University awards the

## **Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security of the E.H.E. European University EurAka Switzerland**

Depending on the numerical average achieved in all modules, the Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security can be awarded in the following classes:

% of Obtained Mark	Grade point	Grade Symbol	Values	Explanation
90.00-100%	4	A+	High Distinction	Showing outstanding achievement
80.00-89.99%	3.83	A	Distinction	
70.00-79.99%	3.67	A-	Merit	show honors achievement of a more higher than average achievement of other students of the class
65.00-69.99%	3.33	B+	Pass with satisfaction/Average	Show satisfactory performance with an average performance
60.00-64.99%	3.00	B		
55.00-59.99%	2.33	C+	Pass	Showing percentage less than the average achievement of all students in the same class
50.00-54.99%	2.00	C		
45.00-49.00%	1.67	D+	Fail	Reset- Students can sit chance exam
40.00-44.99%	1.33	D		
00.00-39.99%	1.00	F	Fail	Retake-Students have to re-register for that exam

In addition to their Bachelor Certificate, students will additionally receive a full Transcript issued in form of the Europass of the European Union. Students terminating their studies before completion or are not fulfilling the criteria (fails, academic misconduct) for obtaining the Bachelor Degree will obtain a Transcript stating subjects attended and the amount of credits being awarded until the moment of termination.

### 3. Admission to the Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security

#### 3.1 Admittance by Education

The programme of studies addresses candidates, who have finished school with a good College Degree, Baccalaureate or equivalent other national qualification.

#### 3.2 Work-based Entry Route

Applications from professionals without a College Degree or Baccalaureate or equivalent on national level, who can instead submit evidence of a credible professional education with their application, such as an apprenticeship or national equivalent, are equally encouraged to apply.

Those candidates having sufficient work experience (e.g. gained in an apprenticeship) can only be admitted by providing evidence of such experience. These candidates are invited seeking advice with their local study centre or the Registry of the EurAka University for further details and information for an individual assessment of their prior qualification.

#### 3.3 Application Process

Applications must be made through the application form and are equally welcomed from individual candidates or from those being sponsored by employers. Only complete applications will be considered. The application form has to be accompanied by

- ❖ A certified copy of the latest School Degree (if applicable) and/or
- ❖ Written evidence of the existing professional education and/or experience
- ❖ Two photographs in passport size
- ❖ A copy of the passport

The Registry of the EurAka University will issue a Letter of Acceptance for successful applicants enrolling and admitting the candidate to the programme of studies.

### 4. Course Outline

**4.1 Mission of the Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security** The Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security is an Undergraduate programme of studies preparing candidates for qualified professional roles in IT organisations.

The programme's purpose is to educate the responsible professional, who understands the general picture and wider implications by which organisations of this particular industry are driven.

Contemporary professionals must also respect high standards of ethics and moral, which are indispensable elements within the demand for sustainable management meeting the multiple challenges of economy and society. In today's complex environment professionals have to respect the objectives of multiple constituents and a variety of stakeholders with differing interests.

Internalising these criteria into the studies enhances Graduates' employability and career opportunities within IT related organisations significantly. The programme of studies supports Graduates to differentiate themselves from employees, whose capabilities are limited to professional experience alone.

The Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security provides candidates with superior knowledge being fully concentrated on best practice and future developments, but focuses on modern organizational challenges, forces, and values driving these. The course combines knowledge on organisations and introduces the understanding of key management practice skills and respects professional standards of the IT related industry.

#### **4.2 Strategic Aims**

Shared aims unite all modules of the Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security. These objectives are:

- ❖ To introduce to and use theory, practice-oriented insights and demonstrations to enhance candidates' intellectual caliber, professional and future leadership skills, and problem solving capacity.
- ❖ To communicate sophisticated understandings of present and future problems and challenges typically found in contemporary IT related organizations and to identify scope for general and particular improvements.
- ❖ To analyse and foster appropriate professional roles contributing to managing the contemporary IT related organisation. It further informs about the wider corporate responsibilities by using sophisticated approaches to drive organisational development and to meet the needs of demanding customers and guests, and multiple organizational constituents and contexts.
- ❖ To explore scope and content of organisational and functional effectiveness being focused on turbulent markets, organisational sustainability and progress within the permanently changing environment in a national, international, and global context.

### 4.3 Learning Outcomes of the Programme of Studies

The Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security programme of studies develops profound knowledge of contributing to the management of the contemporary organisation. It is specifically designed for meeting the concept of Employability Impact.

The particular intended learning outcomes are:

- ❖ Introduce to critical thinking and analytical approaches to theories and best practice of contemporary hospitality organisational contexts by analysing the internal and external environment.
- ❖ Further the ability to read, understand, and make sense of the specific organizational needs for sustainable organisational progress in the IT related industry.
- ❖ Develop the capacity to evaluate and critically analyse, how organisational functions effectively and efficiently interact for performance improvements.
- ❖ Apply own high standards of moral and ethical behaviour contributing to that of an organisation.
- ❖ The aims for each of the individual modules that make up the Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security are set out in the individual module specifications of Chapter 5.

### 4.4 Standard Period of Studies

The duration of this programme of studies is structured to be accomplished within four (4) years of studies, but may be extended to a maximum of six (6) years on request. Extensions are subject to a student's application and must be approved by a local study centre and/or the EurAka University.

## 5. Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security)

### 5.1 Introduction to the Program

The 'EurAka' **Bachelor of Computer Science (Hons) in Network Technology and Cyber security** is focused a unique opportunity to learn about specialist security techniques and use real-world networking equipment in a security context. Students are also educated about market-leading Cisco Routing & Switching Techniques, security appliances, ethical hacking techniques, vulnerability analysis, and penetration testing and data encryption technology. This program has been designed to equip the individual with global knowledge of network and security

### 5.2 Programme Facts

Program Name	Bachelor of Computer Science (Hons) in Network Technology & Cyber Security
Program Duration Years	4 years



Semester Duration (Months)	6 Months
Intake Months	November, May
No. of Semesters	8
Level	Bachelor
Field of Study	Science, Mathematics & Computing
ECTC Credits	240 ECTC

Table 3 Programme Facts

### 5.3 ProgramObjective:

The objectives of the course are aimed at:

- Computer systems and network, establishes link between people and businesses on a global scale. Business and industry is dependent on diverse network technologies and there is a high demand for professionals for designing as well as efficiently managing network systems.
- Our technology-infused course comprises technology, security and networking modules and thus offers diverse job opportunities for students. We also emphasize on the installation, operation, security and maintenance of computer systems as well as networks as far as business and industry is concerned.
- The course will equip the students with the essential skills for designing, implementing and managing systems effectively to ensure that people benefits from the use of these systems. This learning will also help the students to manage, design, implement, configure and operate secure networks on a professional footing and identify the threats to network security and formulate and implement defense strategies and mechanisms.

### 5.4 Entry Requirement

- 12 (Science and Management) / Diploma in IT
- Pass Foundation programs in Business & Computing Foundation; or
- Pass STPM; or secured at least second division in the 10+2,, PCL or equivalent program equivalent
- Pass A level with 5 credit (English & 4 other subjects); or equivalent to Government agency

### 5.5 Learning activities and assessment

The examination will be conducted and monitored by European University EurAka, in presence of the representative from University. To successfully complete a subject/ module, the student has to achieve Pass marks in both internal assessments as well as final examination.

- Mixture of formal lectures, tutorials & Seminars and Practical sessions.
- Supervised Group works, Course Works.
- Regular Assignments, Assessments in the form of practical coursework, lab tests, written exams
- Case study, presentation, project works
- Evaluation of learning outcome will vary according to the need of the modules

Type of Assessment	Components of Assessment	Weightings of Components (%)
Written test (50%)	Final University Examination	50

<b>Course Work (50%)</b>	Test –Mid-Term Examination	10
	Written Assignment-1 (1000 words)	10
	Written Assignment-2 (1000 words)	10
	Project Work/Case Study	10
	Quizzes	5
	Attendance	5
	<b>Total</b>	<b>100</b>

*Table 4 Types of Assessment for the Programme*

## 5.6 Graduation Certificate

After successful completion of the course the EurAka University will provide the graduation certificate to the students. Only the students who will garner the cumulative grade point average of 2.0 will be eligible for graduation. Students who cannot achieve the benchmarked summative assessment will be given a chance to repeat the specified items. Students are awarded with

- **The Certificate of the Bachelor of Computer Science (Hons) in Network Technology and Cyber Security** being officially recognized and part of the official Process of Harmonisation of Higher Education in Europe (Bologna Process)
- **The Transcript in form of the official Diploma Supplement ‘Europass’** of the European Union facilitating continuation to Master’s studies internationally.

This way, Graduates are equipped with outstanding knowledge and skills in Hospitality Management, but also the right officially and widely recognised documentation for their Degree on international level.

## 5.7 Career Opportunities

After successful completion of the course, students can make their career as the following area and post

- Network Engineer
- Network Support Specialist
- Network Administrator ➤ System Administrator
- Security Engineer , Network Consultant
- Ethical Hacker
- Security Administrator
- Network Communication Engineer
- Security Consultant
- Penetration Tester
- Computer Science Teacher

- Information Security Specialist
- Network Design Engineer

## 5.8 Module Structure

### Semester 1

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-101	Introduction to IT	6
2	EUCSC-102	Programming Fundamental using C	6
3	EUCSC-103	Data Communication & Networking	6
4	EUMTH-151	Computational Mathematics I (Continuous)	6
5	EUENG-175	Communication English	6
		Total	30

**Semester 2**

SN	Course Code	Course Title	ECTS Credits
1	EUMTH-152	Computational Mathematics II (Discrete)	6
2	EUENG-176	Technical & Professional Communication	6
3	EUCSC-104	Object Oriented Programming (C++ / Java)	6
4	EUCSC-105	Database Management System	6
5	EUCSC-106	Digital Electronics & Logic Design	6
		Total	30

**Semester 3**

SN	Course Code	Course Title	ECTS Credits
1	EUMTH-253	Numerical Method	6
2	EUCSC-201	Data Structure & Algorithm	6
3	EUCSC-202	Network Analysis & Design	6
4	EUCSC-203	Routing and Switching Essentials	6
5	EUCSC-204	Organization & Management	6
		Total	30

**Semester 4**

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-205	Probability & Statistics	6
2	EUCSC-206	Network Operating System	6
3	EUCSC-207	Network & System Administration	6
4	EUCSC-208	Client Server Computing	6
5	EUCSC-209	Wireless and Mobile Communication	6
		Total	30

**Semester 5**

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-301	Network Security	6
2	EUCSC-302	Network Programming	6
3	EUCSC-303	Research Methodology	6
4	EUCSC-304	Fundamentals of Project Management	6
5	EUCSC-305	Network Management	6
		Total	30

**Semester 6**

SN	Course Code	Course Title	ECTS Credits
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1	EUCSC-306	Server Administration	6
2	EUCSC-307	Broadband Networks	6
3	EUCSC-308	Ethical hacking	6
4	EUCSC-309	Project I	6
5		Elective I	6
		Total	30

**Semester 7**

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-401	Cyber Security & IOT	6
2	EUCSC-402	Artificial Intelligence	6
3	EUCSC-403	IT Acts and Cyber law	6
4	EUCSC-404	Project Dissertation – II	6
5		Elective II	6
		Total	30

**Semester 8**

SN	Course Code	Course Title	ECTS Credits
1.	EUCSC-409	Organization Behaviour and HRM	6
2.	EUCSC-410	Industrial Training	12
3.		Elective III	6
4.		Elective IV	6
		Total	30
		Grand Total	240

**List of Elective Subjects**

SN	Subject Code	Subject	Group
1.	EUCSC-310	Distributed Networking	Elective -I
2.	EUCSC-311	E-Governance	
3.	EUCSC-312	Data Center Design and Management	
4.	EUCSC-313	Linux for system Administration	
4.	EUCSC-405	Cryptography	Elective - II
5.	EUCSC-406	E-Commerce	
6.	EUCSC-407	Net Centric Design	
7.	EUCSC-408	Security Audit	
8.	EUCSC-411	GIS	Elective -III
9.	EUCSC-412	Advance Java Programming	
10.	EUCSC-413	Information Security	

11.	EUCSC-414	Cyber Forensics	Elective-IV
12.	EUCSC-415	Advanced Networking with IPv6	
13.	EUCSC-416	Cloud Computing	
14.	EUCSC-417	Introduction to Programming with Python	
15.	EUCSC-418	Criminal Evidences and Procedures	

# Frist Semester

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-101	Introduction to IT	6
2	EUCSC-102	Programming Fundamental using C	6
3	EUCSC-103	Data Communication & Networking	6
4	EUMTH-151	Computational Mathematics I (Continuous)	6
5	EUENG-175	Communication English	6
		Total	30

## 1.INTRODUCTION TO IT

Course Title	Introduction to IT	Language of Instruction	English
ECTS Credits	6	Course Code	EUENG-175
Department	English	Level of Course	4
Year/Semester	1st Year/ First Sem.	Type of Course	Major /Com
Prerequisites	None	Co-Requisites	None
Field	Computer System	Semester	Fall, Spring
Mode of Delivery	face-to-face/Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment (Theory)	50%	Internal Assessment (Workshop, Practical, Assignment, Course Work)	50%

### Restrictions:

This module is restricted to Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security, Bachelor of Computer Science in (Software Engineering / Web Development / IT management).

### Supplementary Regulations:

This module has no supplementary regulations

### Module Summary:

#### EUCSC-101: Introduction to IT

This module provides basic knowledge of the hardware and software components that make up a computer system. Modern computer systems not only consist of just the computer, but also include a range of peripherals. The module gives an overview of all the important concepts in preparation for a deeper study of computer systems.

Learning environments are offered to enable students to gain a basic comprehension, understanding and appreciation of computer system concepts and technologies, and the skills to use them to the best effect.

#### Overall Aims/Objectives of the module

- Provide an overview of the importance of computer systems.
- To provide students on all pathways with an appreciation of computer systems suitable for them to build on appropriately in their selected specialism.

### Learning Outcomes:

#### Knowledge and Understanding

On successful completion of the module, students at will be able to:

- a) Describe and understand, to a satisfactory level, the purpose of the hardware components that make up a computer

- b) Describe and understand, to a satisfactory level, the workings and use of common peripheral devices such as printers and scanners
- c) Understand and explain, to a satisfactory level, the software necessary for the use of a computer system

### Subject specific skills

On successful completion of the module students will have demonstrated their ability to:

- d) Use a most essential subset of operating system functions to manage both software and information stored on the computer and a network
- e) Set-up data files
- f) Learn how to use software from provided instructions

### Key Skills

On successful completion of the module students will have had the opportunity to:

- g) Learning to Learn: demonstrate an ability to work out new uses of computers in the work place, in the home, and in education
- h) Communication skills: present a satisfactory appreciation of the implemented solution to a peer group, verbally and in writing.

### Module Indicative Content:

This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems.

In particular, the following topics will be addressed:

<b>Week 1</b>	<b>Unit -1</b>	<b>6HR</b>
<b>Information Technology basics:</b> - Basic Digital Logic Elements: Mosfet gates and logics, Digital System; Gates: - AND, NOT, OR, NAND, NOR, XOR, X-NOR; Number representation and system:-Binary, Octa, Decimal, Hexadecimal.		
<b>Week 2</b>	<b>Unit -2</b>	<b>5HR</b>
<b>The computer system:</b> - Computer Architecture and how computers work, The structure of the hardware of a typical PC (Memory, Processor, Storage devices), Use and workings of typical peripheral devices (Scanner, Standalone printer and network printer, and Latest used devices).		
<b>Week 3</b>	<b>Unit -3</b>	<b>5HR</b>
<b>Operating system:</b> Function and purpose of Operating System, Features, Types; Operating system fundamentals Windows 9x NT/2000 / 2003 and XP Operating systems		
<b>Week 4</b>	<b>Unit -4</b>	<b>5HR</b>
<b>Assembly language programming:</b> Assembling a computer, advanced hardware fundamentals, Servers, Printers and printing, Preventative maintenance and upgrading.		
<b>Week 5</b>	<b>Unit -5</b>	<b>5HR</b>
Computer Software and Software Development: Introduction to Computer Software, Operating Systems, Application System Software, Programming Languages, General Software Features and Trends,		
<b>Week 6</b>	<b>Unit -6</b>	<b>6HR</b>



<b>Introduction of Networking and its Types:</b> (LAN, MAN, WAN), Client Server, Communication Media CAT 6, Fiber, WAN, Introduction of Data Communication and its illustration using TCP / IP		
<b>Week 7</b>	<b>Unit -7</b>	<b>6HR</b>
<b>Internet and Web Technologies in Information Technology:</b> Internet, Multimedia tools and system, Intranets, Electronic Commerce, Web Application and its security,		
<b>Week 8</b>	<b>Unit -8</b>	<b>6HR</b>
<b>Issues surrounding the use of Information Technology:</b> Issues, Troubleshooting, Change management, management framework		
<b>Week 9</b>	<b>Unit -9</b>	<b>6HR</b>
<b>Selection of Case Study</b> (an organization in real time scenario), Report Writing of Case Study, Citation and Referencing.		
<b>Week 10</b>	<b>Unit -10</b>	<b>6HR</b>
Course Work Discussion and Selection, Progress Report Templating, Class Discussion on case study & course work,		

**JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY\*:**

Ideas introduced and developed in lectures and seminars will be reinforced through the use of applied problems so that students can, in groups and on an individual basis, develop their skills, knowledge and understanding. The module will be delivered through a combination of lectures, seminars and practical classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:

TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
24 x 1 hour seminar/practical	24
24 x 1 hours lectures	24
Tutor class preparatory reading and seminar preparation	72
Written assignment with a presentation	25
Examination	25
Revision	15
Skills development and revision	15
<b>Total</b>	<b>200</b>

**Learning Activities and Teaching Methods:**

- Interactive lectures;
- In-class writing workshops;
- Discussion with class participation

**Assessment Methods/ Assessment Criteria:**

This module will be assessed through two in-programme assignments. Each assignment may involve the development and testing of software and adherence to appropriate standards. Group work will be taught, developed and assessed and the students will be required to demonstrate any developed software via a viva/presentation. The combination of these assignments will cover the full spectrum of learning outcomes.

This module will be assessed through project-based in-programme practical assignments, which will include group work and viva/presentation of findings.

- Homework assignments (3),

Research paper,  
Final Exam

Type of Assessment	Components of Assessment	Weightings of Components (%)	Week Due
Written test (50%)	Final University Examination	50	End of the semester
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	8
	Written Assignment-1 (1000 words)	5	6
	Written Assignment-2 (1000 words)	5	12
	Case Study	10	16
	Project Work in Group (Max 2)	10	17
	Quizzes MCQ Test	5	17
	Attendance (Min. 85%)	5	
	Total	100	

**Required Textbooks:**

Authors	Title	Publisher	ISBN
Efrain Turban	<i>Introduction to Information Technology</i>	John Wiley & Sons, Inc.; 2nd Edition 2003 edition (2003)	978-0005701645

## 2. Programming Fundamental Using C

<b>Course Title</b>	Programming Fundamental Using C	<b>Language of Instruction</b>	English
<b>ECTS Credits</b>	6	<b>Course Code</b>	EUCSC-102
<b>Department</b>	English	<b>Level of Course</b>	4
<b>Year/Semester</b>	1st Year/ First Sem.	<b>Type of Course</b>	Major /Com
<b>Prerequisites</b>	None	<b>Co-Requisites</b>	None
<b>Field</b>	Computer System	<b>Semester</b>	Fall, Spring
<b>Mode of Delivery</b>	face-to-face/Standard	<b>Delivery</b>	Computing
<b>Maximum/Pass Mark</b>	100/50	<b>Pass Mark</b>	50
<b>University Assessment (Theory)</b>	50%	<b>Internal Assessment (Practice)</b>	50%

**Restrictions:**

This module is restricted to Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security, Bachelor of Computer Science in (Software Engineering / Web Development / IT management).

**Supplementary Regulations:**

This module has no supplementary regulations

**Module Summary:**

## **EUCSC-102. Programming Fundamental Using C**

This is an introductory programming module, designed to develop interest, ability and confidence in using a programming language within a computing environment.

Students to the skills, principles and concepts necessary to solve problems in computing. It also aims to develop essential skills to enable the solution of these problems with the construction of appropriate algorithms and a computer program. Principles underlying the design of a high level programming language will be introduced. This module will empower the students to develop algorithm for problem solving.

### **Overall Aims/Objectives of the module**

- To develop the student's ability to design, analyse, implement and document computer programs as solution to problems.
- To develop problem-solving skills.
- To apply problem-solving skills to develop programs.

### **Learning Outcomes:**

#### **Knowledge and Understanding**

On successful completion of the module, students at will be able to:

- a) Appreciate the principles and practice of analysis and design in the construction of robust, maintainable programs, which satisfy their specifications.
- b) Design, write, compile, test and execute straightforward programs using a high level language; appreciate the principles of programming.
- c) Appreciate the need for a professional approach to design and the importance of good documentation to the finished programs.

#### **Subject specific skills**

On successful completion of the module students will have demonstrated their ability to:

- d) Use an appropriate programming language to construct robust, maintainable programs, which satisfy their specifications.
- e) Design, write, compile, test and execute programs taking into consideration principles of programming.

#### **Key Skills**

On successful completion of the module students will have had the opportunity to:

- f) Apply skills to enable the solution of problems with the construction of appropriate algorithms and a computer program.
- g) Apply group-work skills to enable the solution of problems.

**Module Indicative Content:**

This module introduces students to the skills and concepts necessary to solve problems in computing. It also aims to develop essential skills to solve these problems with a computer program.

In particular, the following topics will be addressed:

<b>Week 1</b>	<b>Problem solving (PS):</b> Documenting the PS process - report writing, Presentation skills - give a presentation, Basic Constructs, Psuedo-code, Introduction to Flow Chart, Functions and testing, Graphical interfaces
<b>Week 2</b>	<b>Programming Elements:</b> Introduction to computers, and directories and programming languages compilation process, Tokens, Delimiters, Variables, Expression, Statements, Comments, Object Code, Source Code, Executable Code, Operating System, Linkers, Loaders, Fundamentals of Algorithms, Input and Output Operation.
<b>Week 3</b>	<b>Operators and Expression:</b> Operators (Arithmetic, Logical, Relational, Bit Wise), Unary, Binary, Ternary, Increment and Decrement, comma, Operand, File Inclusion, Compilation, Directives, Assembling, Linking
<b>Week 4</b>	<b>Data Types &amp; Storage:</b> Integers, long and short, Integers, signed and unsigned, Chars, signed and unsigned, Floats and Doubles, Storage Classes in C, Automatic Storage Class, Register Storage Class, Static Storage Class, External Storage Class
<b>Week 5</b>	<b>Language Fundamentals:</b> Character set, Identifiers, Keywords, Constant and Variables, Statements, Expressions, Precedence of operators, Input-output Assignments, Control structures, Decision making and Branching, Decision making & looping.
<b>Week 6</b>	<b>C Functions:</b> User defined and standard functions, Formal and Actual arguments, Functions category, Return Type, function prototypes, parameter passing, Calling Convention, Call-by-value, Call-by-reference, Recursion, Storage Classes.
<b>Week 7</b>	<b>Arrays and Strings:</b> Introduction, A Simple Program Using Array, Syntax and Semantics, Initialisation, Bounds Checking, Design and style review and compound data types and arrays, Array processing, unconstrained arrays and program errors and testing review, Strings, arrays of Instances and parameter Passing mechanisms (Passing Array Elements to a Function, Passing an Entire Array to a Function), Two Dimensional Arrays, Initializing a 2-Dimensional Array, Memory Map of a 2-Dimensional Array,
<b>Week 8:-</b>	<b>Pointers:</b> Pointer variable and its importance, Pointer Arithmetic, passing parameters by reference, pointer to pointer, linked list, pointers to functions, dynamic memory allocation, Pointers and Arrays, Pointers and 2-Dimensional Arrays, Pointer to an Array, Array of Pointers
<b>Week 9:-</b>	<b>Strings:</b> What are Strings, More about Strings, Pointers and Strings, Standard Library String Functions, strlen( ), strcpy( ), strcat( ), strcmp( ), Two-Dimensional Array of Characters, Array of Pointers to Strings , Limitation of Array of Pointers to Strings
<b>Week 10</b>	<b>Structures, Unions:</b> Declaration of structures, declaration of unions, pointer to structure & unions.
<b>Week 11</b>	<b>Console I/O:</b> Types of I/O, Console I/O Functions, Formatted Console I/O Functions, sprintf( ) and sscanf( ) Functions, Unformatted Console I/O Functions
<b>Week 12</b>	<b>File Handling:</b> Console input output functions, Disk input output functions, Data files

<b>Week 13</b>	(Files/Databases[access/sorting/searching]), Command line arguments, bit wise operators, enumerated data types, type casting, macros, the C pre-processor, more about library functions Course Work Discussion and Selection, Progress Report Templating,
<b>Week 14</b>	<b>Additional Features in C:</b> Algorithm design (modelling) ,Control flow (sequence selection & iteration), Modularity, Data structures (stacks/queues/linked_lists/arrays/containers/bags etc.), Data structures
<b>Week 15</b>	Class Discussion on Project Work and course work
<b>Week 16</b>	Revision Week
<b>Week 17</b>	Revision Week
<b>Week 18</b>	Revision Week
<b>Week 18</b>	Presentation of Project Work and Course Work of Final Draft Report
<b>Week 19-20</b>	Report Submission

**JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY\*:**

Ideas introduced and developed in lectures and seminars will be reinforced through the use of applied problems so that students can, in groups and on an individual basis, develop their skills, knowledge and understanding.

The module will be delivered through a combination of lectures, seminars and practical classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:

TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
- 24 x 1 hour seminar/practical	24
- 24 x 1 hours lectures	24
- Tutor class preparatory reading and seminar preparation	72
- Written assignment with a presentation	25
- Examination	25
- Revision	15
- Skills development and revision	15
<b>Total</b>	<b>200</b>

**Learning Activities and Teaching Methods:**

Interactive lectures;  
In-class writing workshops;  
Discussion with class participation

**Assessment Methods/ Assessment Criteria:**

This module will be assessed through two in-programme assignments. Each assignment may involve the development and testing of software and adherence to appropriate standards. Group work will be taught, developed and assessed and the students will be required to demonstrate any developed software via a viva/presentation. The combination of these assignments will cover the full spectrum of learning outcomes.

This module will be assessed through project-based in-programme practical assignments, which will include group work and viva/presentation of findings.

Homework assignments (3),

Research paper,  
Final Exam

Type of Assessment	Components of Assessment	Weightings of Components (%)	Week Due
Written test (50%)	Final University Examination	50	End of the semester
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	
	Written Assignment-1 (1000 words)	10	11
	Written Assignment-2 (1000 words)	10	20
	Project Work in Group (Max 2)	10	24
	Quizzes MCQ Test	5	15
	Attendance (Min. 85%)	5	
	Total	100	

#### Required Textbooks:

Authors	Title	Publisher	ISBN
<b>Yashavant Kanetkar</b>	Let Us C - 15th Edition by Yashavant Kanetkar	BPB Publications	9788183331630
Brian W. Kernighan, Dennis M. Ritchie	C Programming Language (Ansi C Version) 2nd Edition	Prentice Hall	9788120305960
Kelley and Ira Pohl	A Book on C, Edition 4	Addison-Wesley	0-201-18399-4

### 3. Data Communication & Networking

<b>Course Title</b>	Data Communication & Networking	<b>Language of Instruction</b>	English
<b>ECTS Credits</b>	6	<b>Course Code</b>	EUCSC-103
<b>Department</b>	IT	<b>Level of Course</b>	4
<b>Year/Semester</b>	1st Year/ First Sem.	<b>Type of Course</b>	Major /Com
<b>Prerequisites</b>	None	<b>Co-Requisites</b>	None
<b>Field</b>	Computer System	<b>Semester</b>	Fall, Spring
<b>Mode of Delivery</b>	face-to-face/Standard	<b>Delivery</b>	Computing
<b>Maximum/Pass Mark</b>	100/50	<b>Pass Mark</b>	50
University Assessment (Theory)	50%	Internal Assessment (Practice)	50%

#### Restrictions:

This module is restricted to Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security, Bachelor of Computer Science in (Software Engineering / Web Development / IT management).

#### **Supplementary Regulations:**

This module has no supplementary regulations

## **Module Summary:**

### **EUCSC-103: Data Communication & Networking**

This module aims to give the student a comprehensive and broad understanding of the theory of computer networking.

#### **Overall Aims/Objectives of the module**

- Understands the theory of communication and realizes its application □ Provide appropriate practical skills related to computer networking.
- To provide students with a comprehensive and broad understanding of the theory of computer networking.

#### **Learning Outcomes:**

##### **Knowledge and Understanding**

On successful completion of the module, students will be able to:

- a) Demonstrate an elementary understanding of primary networking concepts
- b) Demonstrate an elementary appreciation of the use of main network structures

##### **Subject specific skills**

On successful completion of the module students will have demonstrated their ability to:

- c) Demonstrate an elementary understanding of protocols, network organisation and addressing
- d) Demonstrate an elementary understanding of flow control, end-to-end error handling
- e) Demonstrate an elementary understanding of OSI and Internet network models

##### **Key Skills**

On successful completion of the module students will have had the opportunity to:

- f) Be capable of managing own learning, making appropriate use of available resources.
- g) Manage time reasonably, make reasonable attendance, attempt timely submission of assignment

#### **Module Indicative Content:**

This module introduces students to the skills and concepts necessary to solve problems in computing. It also aims to develop essential skills to solve these problems with a data communication and networking.

In particular, the following topics will be addressed:

<b>Week 1:-</b>	<b>Overview of communication systems:</b> Overview of Communication Systems, Significant Historical Events and Developments, and Regulatory Bodies; Social and Economic implications from Modern Telecommunications;
<b>Week 2:-</b>	<b>Analogue and Digital Signal Characteristics:</b> Analogue and Digital Signal Characteristics; Bandwidth, Attenuation, Noise and the Decibel; Signal Representation and Spectral Analysis;
<b>Week 3:-</b>	<b>Transmission Media:</b> Transmission Media; Configuration and Installation, Cabling (Straight and Cross over), Jack Plugging (RJ 45), Face plate, Modular jack, Coding Processes and Line Encoding Schemes
<b>Week4 :-</b>	<b>Layering:</b> The Principles of Layering, The Underlying Physical Medium, The Physical Layer, Sending 0 and 1 bits, Synchronous v. Asynchronous Communication, Connection Oriented Services, Connectionless Services, Circuit Switching & Packet Switching, Datagram, OSI Reference Model, Introduction to OSI Layers.
<b>Week 5:-</b>	The Data Link Layer, Sending Data across a Local Area Network, Frames, Character Based Framing, Bit Oriented Framing, Bit Stiffing & Destuffing, Overhead, Framing Error, Error Detection Techniques, Effectiveness of Error Detection Technique, Parity Check Codes, Single Parity Check Code, Horizontal & Vertical Parity, CRC, Mod 2 division, Performance
<b>Week 6:-</b>	<b>Automatic Repeat Request (ARQ):</b> Pure Stop and Protocol, ACK, Stop and Wait Protocol Algorithm, Safety, Correctness of Stop & Wait with binary (finite) SN, RN, Efficiency of Stop & Wait, Stop and wait in the presence of errors, Go back N ARQ, Features of Go Back N, Go Back N ARQ, Sender Rules, Receiver Rules, Go Back 7 ARQ, Retransmission Due to Feedback Errors For Go Back 4 ARQ, Effect of Long Frames, Efficiency of Go back N, Go Back N Requirements, Selective Repeat Protocol (SRP), SRP Rules, Need for Buffering, Efficiency, Why are packets numbered 2w? Optimal Packet Size
<b>Week 7 &amp; 8</b>	<b>Introduction to Queueing Theory:</b> Packet Switched Networks, Queueing Systems, Random Events, The Poisson Process, Inter – arrival times, Markov Property (Memoryless), Properties of the Poisson Process, Queueing Models, Little's Theorem, Proof of Little's Theorem, Application of little's Theorem, Application to Complex System, Markov Chain for M/M/1 system, Average Queue Size, Packet Switching Vs. Circuit Switching, M server systems: M/M/m, M/M/m queue, Applications of M/M/m, M/M/ Infinity, Blocking Probability, M/M/m/m system: Erlang B formula, Erlang B formula, Markov Chains, Truncation, PASTA, Occupancy distribution upon arrival, Jackson's Theorem
<b>Week 9 &amp; 10</b>	<b>Packet Multiple Access:</b> The Aloha Protocol, Multiple Access Channels, Approaches to Multiple Access (TDMA, FDMA, CDMA), Aloha, Slotted Aloha, Assumptions, Markov Chain for slotted Aloha, Slotted Aloha, Throughput of Slotted Aloha, Instability & Stabilized slotted aloha, TDM vs. slotted aloha, Pure Aloha, Splitting Algorithms, Tree Algorithm, Throughput Comparison



<b>Week 11</b>	<p><b>Local Area Networks:</b> Carrier Sense Multiple Access (CSMA), Rules for slotted CSMA, Analysis of CSMA, Maximum Throughput for CSMA, Unslotted CSMA, CSMA / CD and Ethernet, Time to detect collisions, Approximate model for CSMA / CD, Analysis of CSMA / CD, Token Ring, Release of Token, Packet</p> <p>Transmission, Delay Analysis, Throughput Analysis, Token Ring Issues, FDDI, Token Buses, Implicit Tokens, Distributed Queue Dual Bus, DQDB Reservations, Large Propagation Delay, Satellite Reservations, Aloha Reservations, Packet Multiple Access Summary, Migration to Switched LANs.</p>
<b>Week 12</b>	<p><b>Packet Switching:</b> Packet Switches, Generation of Switches, Switch Architectures, Distributed Buffer, Interconnection Networks, Self Routing, Baseline Network, Throughput Analysis of Interconnection</p> <p>Networks, Multistage Architecture, Input &amp; Output Buffer Architecture, Queueing Analysis, Input Queued</p> <p>Switches, Achieving 100% throughput in an Input Queued Switch</p>
<b>Week 13</b>	<p><b>Broadcast Routing:</b> Introduction, Graphs, Walks and Paths, Cycles, Connected Graph, Acyclic Graph and Trees, Sub-graphs, Spanning Trees, General Construction of a Spanning Tree, Spanning Tree Algorithm, Distributed Algorithms to find Spanning Trees, Min Weight Spanning Tree, MST Algorithm, Prism-Dijkstra Algorithm, Kruskal Algorithm.</p>
<b>Week 14</b>	<p><b>Routing in Data Networks:</b> Routing, Routing as a Problem, Shortest path Routing, Directed Graphs,</p> <p>Bellman Ford Algorithm, Distributed Bellman Ford, Slow Reaction to Link Failures, Instability, Dijkstra's Algorithm, &amp; its implementation, Routing in the Internet, Distance Vector Protocols, RIP, IGRP, OSPF, Inter-Domain Routing, Bridges, Router &amp; Gateways.</p>
<b>Week 15</b>	<p><b>Optimal Routing:</b> Optimal Routing, Formulation of Optimal Routing, Optimal Routing Solution, Routing in the Internet, Distance Vector Protocols, Link State Protocols, Inter-Domain Routing, Bridges, Routers and Gateways.</p>
<b>Week 16</b>	<p><b>Flow and Congestion Control:</b> Flow Control, Without Flow Control, Objective of Flow Control, Fairness, Deadlock from Buffer Overflows, Window Flow Control, End to End Windows and its behaviour, Choice of Windows Size, Impact of Congestion, Problems with Windows, Node by Node Windows, Rate based Flow Control, Leaky Bucket Rate Control, Queueing Analysis of Leaky Bucket, Choosing a value for <math>r</math>, Max</p> <p>– Min Fairness, Max-Min Notation, Max-Min Fair Definition, Bottleneck Link, Max-Min Fair Algorithm,</p>
<b>Week 17</b>	<p><b>Higher Layer Protocols:</b> Network Layer &amp; internet working, Packet Switching, Virtual Circuit Packet Switching, TCP / IP Protocol Suite, Internetworking with TCP/IP, Encapsulation, Bridges, Routers and</p> <p>Gateways, IP addresses, Host Names, Internet Standards, The Internet Protocol (IP), Header Fields in IP,</p> <p>IP HEADER FIELDS, FRAGMENTATION, POSITION OF FRAGMENT, IP Routing, Subnet addressing, Classless inter-domain routing (CIDR), Dynamic Host Configuration (DHCP), Address Resolution Protocol, Routing in the Internet, IPv6, Resource Reservation (RSVP), User Datagram Protocol (UDP), UDP header format, Transmission Control Protocol (TCP), Basic TCP operation, TCP header fields, TCP header fields, TCP error recovery, TCP timeout calculation, TCP congestion control, Dynamic adjustment of window size, Random Early Detection (RED), Impact of transmission errors on TCP congestion control</p>
<b>Week 18</b>	Revision Weeks

<b>Week 18</b>	Revision Weeks
<b>Week 20</b>	Project Work & Course Work Revision Weeks

### **JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY\*:**

Ideas introduced and developed in lectures and seminars will be reinforced through the use of case studies so that students can, in groups and on an individual basis, develop their skills, subject specific understanding and skills.

The Module will be delivered through a combination of lectures, seminars and student centred tasks. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:

TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
24 x 1 hour seminar/practical Classes	24
24 x 1 hours lectures	24
Student-Centred learning	72
2 x In-programme assignment, 2,000 words or equivalent	50
Tutorial, Skills, development and revision	30
Total	200

#### **Learning Activities and Teaching Methods:**

- Interactive lectures;
- In-class writing workshops;
- Discussion with class participation **Assessment Methods/ Assessment Criteria:**

This module will be assessed through a combination of a single in-course assignment and an end-of-module written examination. The in-course assignment could, perhaps, involve the design of a network to match particular criteria, however it is unlikely that the single in-course assessment will encompass all of the underlying theory, consequently, it is anticipated that the examination will provide a vehicle to complement, extend and reinforce the in-course assessment.

It is proposed that the module will be assessed by two in programme assignments. Homework assignments (3), paper, Final Exam

Type of Assessment	Components of Assessment	Weightings of Components (%)	Week Due
Written test (50%)	Final University Examination	50	End of the semester
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	
	Written Assignment-1 (1000 words)	10	11
	Written Assignment-2 (1000 words)	10	20
	Project Work in Group (Max 2)	10	20
	Quizzes MCQ Test	5	19
	Attendance (Min. 85%)	5	
	Total	100	

#### **Required Textbooks:**

- Bertsekas, Dimitri, and Robert Gallager. *Data Networks (2nd Edition)*. Upper Saddle River, NJ: Prentice Hall, 1991. ISBN: 0132009161.
- Peterson and Davie. *Computer Networks (2nd Edition)*. San Francisco, CA: Morgan Kaufmann Publishers, 1999. ISBN: 1558605142.
- Tanenbaum, A. S. *Computer Networks*. 4th ed. Upper Saddle River, NJ: Prentice Hall, 2003. ISBN: 0130661023.

#### 4. Computational Mathematics I

<b>Course Title</b>	Computational Mathematics -I	<b>Language of Instruction</b>	English
<b>ECTS Credits</b>	6	<b>Course Code</b>	EUMTH-151
<b>Department</b>	IT	<b>Level of Course</b>	4
<b>Year/Semester</b>	1st Year/ First Sem.	<b>Type of Course</b>	Major /Com
<b>Prerequisites</b>	None	<b>Co-Requisites</b>	None
<b>Field</b>	Computer System	<b>Semester</b>	Fall, Spring
<b>Mode of Delivery</b>	face-to-face/Standard	<b>Delivery</b>	Numeric
<b>Maximum/Pass Mark</b>	100/50	<b>Pass Mark</b>	50
<b>University Assessment (Theory)</b>	50%	<b>Internal Assessment (Practice)</b>	50%

##### **Supplementary Regulations:**

This module has no supplementary regulations

##### **Module Summary:**

EUMTH -151: Computational Mathematics

This module will provide most of the mathematics needed to provide an adequate foundation for subsequent modules including, Formal Specification of Software Systems, and computing.

Many areas of mathematics, and applications of mathematics in the applied sciences, are underpinned by the concepts of calculus, i.e. differentiation and integration.

The first aim of this course is to provide an introduction to calculus in several variables that will form a basis for later courses. This theory will be demonstrated using examples drawn from maximising or minimising functions of one or more variables (with or without constraints), the solution of ordinary differential equations, and the solution of simple partial differential equations.

The second aim of the course is to introduce some computational techniques in calculus, for example numerical integration, the numerical solution of differential equations, Fourier analysis, and finding the solution of nonlinear equations in one or more variables. These techniques lend themselves to practical implementation, allowing demonstration of the theory developed during the course. **Overall Aims/Objectives of the module**

This module aims to provide students with:-

- To introduce the basics of mathematics to gain the knowledge and skills for computing Linkage of the mathematical skills in the field of application
- To gain the skills so that the students can apply the knowledge to the field of computing

##### **Learning Outcomes:**

## Knowledge and Understanding

This is an introductory course in calculus. Students will learn:

- how to differentiate a function of one or more variables using, for example, the chain rule, the product rule, and change of variables;
- Taylor's theorem of one or more variables;
- finding maxima and minima of functions of one or more variables either with or without constraints;
  - Integration by parts;
- Simple methods for the solution of ordinary differential equations;
- Methods for numerical quadrature;
- Fourier series representation of functions;
- Simple numerical methods for the numerical solution of ordinary differential equations;
- Simple methods for the solution of partial differential equations;
- Iterative methods for finding the solution of nonlinear algebraic equations.

## Subject specific skills

On successful completion of the module students will have demonstrated their ability to:

- create simple specification models, using an elementary sub-set of discrete mathematics; ➤employ basic symbolic notations to express relationships unambiguously; ➤interpret simple symbolic representations of partial requirements.

## Key Skills

- Functions of several variables. Partial differentiation. The chain rule and the product rule.
- Taylor's theorem for a function of one variable and the connection with extrema. Taylor's theorem for a function of several variables. Maxima, minima and saddle points of functions of several variables.
- Solution of nonlinear equations in one dimension and higher dimensions using Newton's method. The connection with optimisation of functions. Lagrange multipliers for constrained optimisation.
- Integration of a function of one variable, integration by substitution, integration by parts. Calculation of the area under a curve by integration. Simple methods for numerical integration: the trapezium rule and Simpson's rule. ➤Fourier series representation of periodic functions.
- Ordinary differential equations. Initial value problems, boundary value problems. Solution of separable first order equations and constant coefficient second order problems. Simple numerical methods for first order equations. Solution of second order difference equations and their application to numerical methods for second order boundary value problems.
- Simple partial differential equations. Separable solutions to the heat equation in one dimension. Reduction of partial differential equations to ordinary differential equations by change of variables.

## Module Indicative Content:

<b>Week 1-2</b>	<b>Logical conjunction:</b> Logical conjunction; disjunction; negation; implication; equivalence; precedence order for logical operators.
<b>Week 3-4</b>	<b>Ordered Pairs:</b> Ordered pairs; Cartesian product; Relations; maplets; digraphs; Symbolic forms; domain and range; inverse relation; relational image; restriction/co-restriction for domain and range; composition of relations; identity relation.
<b>Week 5-6</b>	<b>Function:</b> Partial and total functions; function application; overriding; function definition; injective, surjective and bijective functions.
<b>Week 7-8</b>	<b>Differentiation:</b> Differentiation of functions of one or more variables using classical, complex, and vector/matrix formulations, Taylor's theorem, and classification of turning points of multivariate functions.

<b>Week9-10</b>	<b>Integration:</b> Integration of simple multivariate functions. Numerical integration: the trapezium rule and Simpson's rule, Integration by Substitution, Integration by Parts, Calculation of the area under a curve by integration, Simple method of numerical integration
<b>Week 11-12</b>	<b>Differential Equation:</b> Ordinary differential equations: initial value problems; boundary value problems; separable solutions; solution of simple second order boundary value problems. Simple numerical methods for first order equations,
<b>Week 13-14</b>	<b>Simple Partial Differential Equation:</b> Simple partial differential equations. Separable solutions to the heat equation in one dimension. Reduction of partial differential equations to ordinary differential equations by change of variables
<b>Week 15-16</b>	<b>Fourier Series:-</b> Fourier series representation of functions, and the Fast Fourier Transform. Newton's method for the iterative solution of nonlinear equations in one and many dimensions
<b>Week 17-18</b>	<b>Vitiate Function;</b> Optimisation of multivariate functions, and the use of Lagrange multipliers for constrained optimization, Introduction to techniques for the numerical solution of initial value ordinary differential equations.
<b>Week 19-20</b>	<b>Revision</b>

**JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY\*:**

It is felt that one of the major problems for students working in this area is the unfamiliarity of the many symbolic forms. It is to be hoped that, by the time the students embark on the subsequent relevant modules, the symbolic notations will no longer be a potential hurdle and, to this end, much of the time will be devoted to encouraging the students to work their way systematically through as many exercises as possible and, thus, achieve the necessary degree of familiarity.

The module will be delivered through a combination of lectures, seminars and tutorial classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered.

TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
- 24 x 1 hour seminar or tutorial /exercisel Classes	24
- 24 x 1 hours lectures	24
- Independent Study	102
- 2 x In-programme assignment	50
<b>Total</b>	<b>200</b>

**Learning Activities and Teaching Methods:**

- Interactive lectures;
- In-class writing workshops;
- Discussion with class participation

**Assessment Methods/ Assessment Criteria:**

This module will be assessed through a combination of two in-programme time-constrained-assignments.

Each time-constrained assignment will seek to allow students to demonstrate and report on their grasp of the mathematical skills needed to support practical applications of software development.

It is proposed that the module will be assessed by two in programme assignments.

- Homework assignments (3),
- Research paper,

## Final Exam

Type of Assessment	Components of Assessment	Weightings of Components (%)	Week Due
Written test (50%)	Final University Examination	50	End of the semester
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	
	Written Assignment-1 (1000 words)	10	11
	Written Assignment-2 (1000 words)	10	20
	Project Work in Group (Max 2)	10	24
	Quizzes MCQ Test	5	15
	Attendance (Min. 85%)	5	
	Total	100	

### Required Textbooks:

Erwin Kreyszig: Advanced Engineering Mathematics. John Wiley & Sons.

Dominic Jordan and Peter Smith: Mathematical Techniques. Oxford University Press.

### Status of Module:

Awards Compulsory for:

BSc (Hons) COMPUTING, BSc COMPUTING - (Computer Networks Engineering) (Computer Systems Engineering) (Internet Technology & Security) (Software Engineering)

HND COMPUTING - (Computer Networks Engineering) (Computer Systems Engineering) (Computer Studies) (Internet Technology & Security) (Software Engineering) HNC COMPUTING, BSc/HND Computing (Mobile Computing), BSc/HND Computing (Graphics & Visualisation) ,BSc/HND Computer Games Development.

Joint and Combined Honours: Computing.

## 5. Communication English

Course Title	Communication English	Language of Instruction	English
ECTS Credits	6	Course Code	EUENG-175
Department	English	Credit Hour	3
Prerequisites	None	Type of Course	Major /Elective
Field	Language	Semester	Fall, Spring
Level of Course	1st Cycle	Year of Study	1st
Mode of Delivery	face-to-face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment (Theory)	50%	Internal Assessment (Practice)	50%

### Objectives of the Course:

The objectives of the course are as follows:

- To teach students how to produce academic papers (research papers & theses);

- To develop the style and vocabulary characteristic of academic writing;
- To develop academic reading and writing skills that allow students to use material more effectively in their own academic papers;

At the end of the semester, students are expected to be close to functioning at C1 (Proficient User) level of the Common European Framework of Reference for Languages.

### Learning Outcomes:

After completion of the course students are expected to be able to:

1. Scan long and complex texts, summarize information and reconstruct arguments in a coherent presentation;
2. Produce organized and coherent essays with clear paragraphs and use of methods for introducing and concluding an essay;
3. Write well-supported essays using different patterns of development (illustration, cause and effect, process analysis, persuasion) taking into consideration purpose and audience.
4. Write proposals, critical analyses, summaries and literature reviews;
5. Demonstrate techniques to avoid plagiarism (paraphrasing, summarizing and quoting) and produce research papers with correct parenthetical and bibliographical citations using specific documentation styles such as MLA, APA, Harvard etc.);
6. Write accurately with a wide vocabulary and few errors in spelling or punctuation.

### Course Content:

<b>Week 1-2</b>	Introduction to Communication in Academic Culture, Communication Weekly Topics & Learning Outcomes, Survival Skills for University, introduce yourself, Speech delivery about the course.
<b>Week 3:</b>	<b>COMMUNICATION:</b> - Introduction to communication, Channels of communication, Types of communication, Barriers to effective communication, Hospitality communication skills, Nonverbal communication: Body language
<b>Week 4</b>	<b>:- WRITING CREATIVITY:</b> Tradition, culture, and event related to Computer Science and IT Related industry, Essay related to the Computer Science and IT Related industry, IT, Computer Science related articles for promotion
<b>Week 5-6</b>	<b>Technical Writing:</b> Front Cover (TITLE of the document, NUMBER of the document, VERSION of the document, TITLE of the software (if it's a software document), VERSION of the software (if it's a

	<p>software document), RELEASE DATE of the document, COPYRIGHT statement, date, GRAPHIC or PRODUCT IMAGE, CORPORATE LOGO, Front Matter (NO page number, COPYRIGHT statement, date and other proprietary Intellectual Property related text, TRADEMARK statement for various brands mentioned in the document, Company information, Contact, web site etc. information, DISCLAIMER text), Referencing, Citation.; Table of Contents (TOC):</p> <p>Starts with PAGE NUMBER “iii” – lower-case Roman numeral “3.”; LIST OF FIGURES (if any) title, and page number.; LIST OF TABLE (if any) title, and page number.; OTHER LISTS (if any) title, and page number.; CHAPTER titles, and page numbers. (LEVEL 1) Indented SECTION titles, and page numbers. (LEVEL 2)</p> <p>Indented SUB-SECTION titles, and page numbers. (LEVEL 3)</p> <p>GLOSSARY titles, and page numbers.; ADDENDUM titles, and page numbers.; APPENDIX titles, and page numbers.; INDEX title, and page number; List of FIGURES (LOF); TITLE of figures and page numbers. Comes right after TOC.; List of TABLES (LOT); TITLE of tables and page numbers. Comes right after LOF.; OTHER List(s)</p> <p>TITLE of other document objects with markers (“Authors” for example) and page numbers.</p>
<b>Week 7</b>	<b>LISTENING SKILLS:</b> Introduction to listening, Types of listening, Barriers to listening, Effective listening technique, Customer complaint handling through listening
<b>Week 8</b>	<b>PRESENTATION SKILLS:</b> Presentation Structure and its rules, Role of communication in presentation, Language used in communication, Using visual aids, Presentation for students
<b>Week 9-10</b>	Participation in Discussion Context, Selection of Topic by a group of 2 students Week 11:- Interpreting, Researching & Planning Written Case study for Presentation, Planning Presentation, Preparing Visual and graphical aid, writing your script for the presentation, preparing the Academic Spoken Language, Preparing the Presentation Style
<b>Week 12-14</b>	Report Submission (Course Work, Assignment, and Project Work)

**Learning Activities and Teaching Methods:**

Interactive lectures;

In-class writing workshops;

Discussion with class participation

**Assessment Methods:**

Homework assignments (3),

Research paper,

Final Exam

Type of Assessment	Components of Assessment	Weightings of Components (%)
Written test (50%)	Final University Examination	50
Course Work (50%)	Test –Mid-Term Examination	10
	Written Assignment-1 (1000 words)	10
	Written Assignment-2 (1000 words)	10
	Project Work/Case Study	10
	Quizzes	5
	Attendance	5
	Total	100

**Required Textbooks:**



Authors	Title	Publisher	Year	ISBN
Joan McCormack, John Slaght	<i>Extended Writing and Research Skills: Course Book (English for Academic Study)</i>	Garnet Education; 2nd Revised edition	2009	1859644864

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Ilona Leki	<i>Academic Writing: Exploring Processes and Strategies</i>	Cambridge, University, Press	2007 2nd Edition	0521657687

# Second Semester

SN	Course Code	Course Title	ECTS Credits
1	EUMTH-152	Computational Mathematics II (Discrete)	6
2	EUENG-176	Technical & Professional Communication	6
3	EUCSC-104	Object Oriented Programming (C++ / Java)	6
4	EUCSC-105	Database Management System	6
5	EUCSC-106	Digital Electronics & Logic Design	6
		Total	30

## EUMTH-152-Computational Mathematics II (Discrete)

<b>Course Title</b>	<b>COMPUTATIONAL MATHEMATICS II</b>	<b>Course Code</b>	<b>EUCSC-152</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Mathematics	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	First
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University			
50%		Internal Assessment	50%

### Assessment

SUPPLEMENTARY REGULATIONS: This module has no supplementary regulations

**MODULE SUMMARY:** This subject offers an higher introduction to mathematics oriented toward computer science and engineering. The subject coverage is divided into three parts:

- Fundamental concepts of mathematics: Definitions, proofs, sets, functions.
- Discrete structures: Elementary number theory, graphs, counting. □ Discrete probability theory.

### OVERALL AIM(S) FOR THE MODULE

Upon completion of this module, students will be able to explain and apply basic knowledge for mathematics in computer science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems. In particular, students will be able to:

- Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by induction.

- Model and analyze computational processes using analytic and combinatorial methods.
- Apply principles of discrete probability to calculate probabilities and expectations of simple random processes.
- Work in small teams to accomplish all the objectives above.

#### LEARNING OUTCOMES\*:

At the end of this course, students will be able to:

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
- Evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
- Synthesize induction hypotheses and simple induction proofs.
- Prove elementary properties of modular arithmetic and explain their applications in computer science, for example, in cryptography and hashing algorithms.
- Apply graph-theoretic models of data structures and state machines to solve problems of connectivity and constraint satisfaction (e.g. scheduling).
- Apply the method of invariants and well-founded ordering to prove correctness and termination of processes and state machines.
- Derive closed-form and asymptotic expressions from series and recurrences for growth rates of processes.
- Calculate numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations.
- Calculate probabilities and discrete distributions for simple combinatorial processes; calculate expectations. □ Problem solve and study in a small team with fellow students.

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

<b>UNIT: 1</b>	<b>6 LH</b>
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**Permutation and Combination:**

Basic principles of counting, factorial notation, permutation, combination and properties of combination

<b>UNIT:2</b>	<b>6 LH</b>
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**Binomial Theorem:**

Binomial theorem for a positive integral index, general term, Binomial coefficients, Binomial theorem for any index(without proof),Application of approximation Euler's number, Expansion of  $e^x$ ,  $a^x$ , and  $\log(1+x)$  without proof.

<b>UNIT:3</b>	<b>6 LH</b>
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**Complex Numbers:**

Definition of a complex number, Integral powers of  $i$ , Algebra of complex numbers(sum difference, multiplication and division) ,properties of complex numbers, Conjugate of a complex number and its properties, Modules of a complex number and its properties, Representation of a complex number by a point in a plane (Argand's diagram). Polar representation of a complex number. Square roots of a complex number) De-moiver's Theorem (statement only) and its application to find up to cube roots of a complex number.

<b>UNIT: 4</b>	<b>6 LH</b>
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**Matrices and Determinants:**

Introduction of matrices, and its types of matrices, equality of matrices, Algebra of matrices, Transpose of matrix, Determinant of a matrix, minors and cofactors of matrix, properties of determinants (without proof) and some simple problems, singular and non-singular matrix. Adjoin and inverse of matrices, solution of a system of non-homogeneous linear equations up to three variables (Cramer's rule, inverse matrix and Gaussian elimination method)

**UNIT: 5****7 LH****Vectors:**

Definition of a vector in plane and Directed line segment, magnitude of a vector, Types of vectors multiplication of vector by scalar, Addition of vectors, Parallelogram law of addition of vectors collinear and coplanar vectors, Linearly dependent and independent vectors, scalar product of two vectors orthogonal vectors, vector product of two vectors.

**UNIT:6****6 LH****Computational methods:**

Evolution of computing, Numerical computing, Number system, Basic Arithmetic of various number system, Operations on different number systems, Approximations and Errors in Numerical methods, Measurement of Errors, Nonlinear equation method of solving Nonlinear equations methods of solving Nonlinear equations.

**UNIT:7****6 LH****Mathematical Induction:**

Mathematical Reasoning, Induction, and Recursion: Proof Strategy, Sequence and Summation, Mathematical Induction, Recursive Definitions and Structural Induction, Recursive Algorithms.

**UNIT: 8****7LH****Graphs:**

Introduction, Graph terminology, representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamiltonian paths, Shortest path problems, Planar graphs, Graph coloring.

**JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY\*:** Ideas introduced and developed in lectures and seminars will be reinforced through the use of applied problems so that students can, in groups and on an individual basis, develop their skills, knowledge and understanding.

The module will be delivered through a combination of lectures, seminars and practical classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:

DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
LECTURE	<u>45</u>
PRACTICAL / WORKSHOP	<u>20</u>
TUTOR CLASS PREPARATORY	<u>40</u>
WRITTEN ASSIGNMENT	<u>25</u>
EXAMINATION	<u>20</u>
REVISION	<u>15</u>
SKILLS DEVELOPMENT	<u>35</u>
TOTAL	<u>200</u>

**ASSESSMENT STRUCTURE\***

Type of Assessment	Components	Weightage	Week Due
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and	10	Week 7, Semester

	Term End)		End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12
	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
<b>Required Books</b>			
<ol style="list-style-type: none"> <li>1. J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill – 1997</li> <li>2. Kenneth H. Rosen – Discrete Mathematics and its Application – 5<sup>th</sup> Edition, McGraw Hill, 2003.</li> <li>3. B.S. Grewal, <i>Higher Engineering Mathematics</i>, Khanna Publications, 40th Edition, 2008</li> <li>4. N. Bali, M.Goyal, C.Watkins, <i>Advanced Engineering Mathematics</i></li> </ol>			

### EUENG-176- Technical & Professional Communication

Course Title	Technical and Professional Communication	Course Code	EUENG-176
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Compulsory
Field	Language	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	First
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

- To understand and demonstrate writing and speaking processes through invention, organization, drafting, revision, editing, and presentation.
- To understand the importance of specifying audience and purpose and to select appropriate communication choices.
- To understand and appropriately apply modes of expression, i.e., descriptive, expositive, narrative, scientific, and selfexpressive, in written, visual, and oral communication.
- To participate effectively in groups with emphasis on listening, critical and reflective thinking, and responding.
- To understand and apply basic principles of critical thinking, problem solving, and technical proficiency in the development of exposition and argument.

To develop the ability to research and write a documented paper and/or to give an oral presentation.

<b>Learning Outcomes:</b> After completion of the course students are expected to be able to: <ul style="list-style-type: none"> <li>• Apply business communication strategies and principles to prepare effective communication for domestic and international business situations.</li> <li>• Identify ethical, legal, cultural, and global issues affecting business communication.</li> <li>• Utilize analytical and problem solving skills appropriate to business communication.</li> <li>• Participate in team activities that lead to the development of collaborative work skills.</li> <li>• Select appropriate organizational formats and channels used in developing and presenting business messages.</li> <li>• Compose and revise accurate business documents using computer technology.</li> </ul>	
<ul style="list-style-type: none"> <li>• Communicate via electronic mail, Internet, and other technologies.</li> <li>• Deliver an effective oral business presentation</li> </ul>	
<b>UNIT: 1</b>	<b>6 LH</b>
<b>BUSINESS CORRESPONDENCE</b> Note Taking only Linear Pattern and Note Making Building a Paragraph using given hints, Business, Communication - Norms and Requirements, Different Forms of Written Communication : Memos, Agenda Minutes of a meeting , etc, Formal Letters – Invitations, Request, Complaints , Orders and Thanks, Questionnaires / Comment Cards / Feedback forms	
<b>UNIT 2</b>	<b>06 LH</b>
<b>JOB SKILLS</b> Resume, Application for Jobs / Covering Letters, Group Discussions – factors, Interviews Types and Preparation for Interviews, Body Language and Interview Etiquette	
<b>UNIT:3</b>	<b>6 LH</b>
<b>LANGUAGE FOR MEDIA AND PUBLICITY</b> Forms of Media, Role of media in Communication, Advertising – its role in the industry, Copywriting - factors and related issues, In-House publicity materials- Use and Factors Involved, Designing / Making of posters, banners, brochures, pamphlets etc	
<b>UNIT: 4</b>	<b>6 LH</b>
<b>GRAPHICAL COMMUNICATION</b> Graphical communication- Types Tables, Graphs, Information Flow Charts, Interpretation from Written to Graphical Form, Interpretation from Graphical Form to Written Form, Using Visual Aids – types and norms for effective usage	
<b>UNIT: 5</b>	<b>7 LH</b>
<b>LANGUAGE ACCURACY-ENGLISH GRAMMAR</b> Editing for making effective presentations, Reports – types and structure, Writing Press Notes and Press Releases, Writing Reports on Events, Project making.	
<b>UNIT:6</b>	<b>6 LH</b>
Case Study	
<b>Learning Activities and Teaching Methods:</b> Interactive lectures; In-class writing workshops; Discussion with class participation  <b>Assessment Methods:</b> Homework assignments (3), Research paper, Final Exam	

DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES			STUDY HOURS
LECTURE			
PRACTICAL / WORKSHOP			
TUTOR CLASS PREPARATORY			
WRITTEN ASSIGNMENT			
EXAMINATION			45 20 40 25 20 15 35 200
REVISION			
SKILLS DEVELOPMENT			
TOTAL			
ASSESSMENT STRUCTURE*			
Type of Assessment	Components	Weightage	Week Due
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	Week 7, Semester End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12
	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
Required Books			
<b>Required Text Books &amp; Reference Books:</b> Lynn van der Wagen, Communication in tourism and hospitality, Publisher: Hospitality Press, Sharma, R.C and Mohan K.; Business correspondence and report writing. Publisher: MHI, Cambridge University Press			

**EUCSC-104- OBJECT ORIENTED PROGRAMMING (C++ / JAVA)**

Course Title	OBJECT ORIENTED PROGRAMMING (C++ / JAVA)	Course Code	EUENG-176
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computing	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	First
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			

- Provide an overview of the importance of Object Oriented Programming.
- To provide students on all pathways with an appreciation of programming language for the advancement of the programming language.
- be able to read and write C and C++ programs;
- understand the interaction between C and C++ programs and the host operating system;
- be familiar with the structure of C and C++ program execution in machine memory;
- understand the object-oriented paradigm presented by C++;
- be able to make effective use of templates and meta-programming techniques as used in the STL; Understand the potential dangers of writing programs in C and C++.

#### Learning Outcomes:

- **Object-oriented programming (OOP)** is a **programming** language model organized around **objects** rather than "actions" and data rather than logic. Historically, a program has been viewed as a logical procedure that takes input data, processes it, and produces output data.
- **Encapsulation**, Abstraction, Overloading, **inheritance**, and **polymorphism** are usually given as the three fundamental principles of object-oriented languages (OOLs) and object-oriented methodology.

#### Subject specific skills

On successful completion of the module students will have demonstrated their ability to:

- Object.
- Class.
- Data Hiding and Encapsulation.
- Dynamic Binding.
- Message Passing. □ Inheritance. Polymorphism

#### Key Skills

On successful completion of the module students will have had the opportunity to:

- Learning to Learn: demonstrate an ability to work out new uses of computers in the work place, in the home, and in education
- Programming Skills: present a satisfactory appreciation of the implemented solution to a peer group, verbally and in written

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

#### UNIT: 1

4 LH

Introduction to Programming Concept: Overview of structural programming approach, Object oriented approach, Features of object oriented languages, Components of object oriented languages like object, class. Elements of Object Oriented Languages: Introduction to inheritance, encapsulation, polymorphism, and abstraction.

#### UNIT 2

04 LH

C++ basics: Introduction, Basic Program Construction like functions and program statements. Output using cout, Directives: Preprocessor Directives, Header Files, The using directives. Comments: Comment Syntax. Integer Variables: Definition, declaration, variables names, assignment statements, integer's constants, output variable. Input with cin, Operators, library functions.

**UNIT:3 4 LH** Control Structures: Introduction, control statements, The if selection structure, The if/else selection structure, The while structure, The For structure, The switch structure, The do/while structure, The break and continue statement.

#### UNIT: 4

3 LH



The Functions: Introduction, Math library functions, Definition/Prototypes, Header files, Storage classes, Scope rules, Recursion, Inline functions, Function Overloading, Function Templates.	
<b>UNIT: 5</b>	<b>47 LH</b>
Arrays: Introduction, Declaring arrays, Passing arrays to functions, Types of arrays; 2.4 Pointers: Introduction, Pointer variables declaration & initialization, Operators in pointers, Calling functions by reference, Relationship between pointers & arrays, arrays of pointers, Function pointers.	
<b>UNIT:6</b>	<b>6 LH</b>
<b>Classes &amp; Objects:</b> Introduction, Features of class, Object and its features, Declaration of class, Using the class, Accessing members of class, Class scope, Initialization class objects: Constructor, Destructor. Object as function arguments: Overload constructor, Member functions defined outside the class, Objects as arguments.	
<b>UNIT:7</b>	<b>5 LH</b>
Operator Overloading: Introduction, Fundamental of operator overloading, Restriction on operator overloading, Operator functions as a class members, Overloading stream-insertion and stream-extraction operators, Overloading unary and binary operators.	
<b>UNIT:8</b>	<b>5 LH</b>
Virtual Functions & Polymorphism, varieties of polymorphism, compile time polymorphism, passing value to function, passing instance and argument to function, return class as value from function, function overloading, operator overloading, type conversion, polymorphic variable, run time polymorphism, object pointer, this pointer, virtual function, overriding, deferred method, pure polymorphism.	
<b>UNIT:9</b>	<b>5 LH</b>
Inheritance: Introduction, Types of inheritance, Protected members, Casting base class pointers to derived – class pointers, Public, protected, and private inheritance. Constructor and Destructor in derived classes.	
<b>UNIT:10</b>	<b>3 LH</b>
Templates: Introduction, Function templates, overloading templates functions, class templates, templates & inheritance.	
<b>UNIT:11</b>	<b>4 LH</b>
Exceptional Handling: Introduction Use of exceptional handling, Try, throw and catch.	
<b>PRACTICAL</b> The module leader is free to design the lab assignments (in class and assignment). The module leader will have to design the lab assignments as follows: <ul style="list-style-type: none"> <li>- To cover each unit</li> <li>- Lab duration is of 1.5 hours at least</li> <li>- Each unit must be covered with 2 in class demonstration and 5-10 assignment covering of the unit. -Each lab must be equipped with Pre Report, Post Report and viva. The students will have to demonstrate the final exam of the practical.</li> </ul>	
<b>WITH SKILLS DEVELOPMENT</b>	
<b>Learning Activities and Teaching Methods:</b> Interactive lectures; In-class writing workshops; Discussion with class participation <b>Assessment Methods:</b> Homework assignments (3), Research paper, Final Exam	
DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
LECTURE	
PRACTICAL / WORKSHOP	

TUTOR CLASS PREPARATORY			
WRITTENT ASSIGNMENT			
EXAMINATION			45 20 40 25 20 15 35 200
REVISION			
SKILLS DEVELOPMENT			
TOTAL			
<b><u>ASSESSMENT STRUCTURE*</u></b>			
<b><u>Type of Assessment</u></b>	<b><u>Components</u></b>	<b><u>Weightage</u></b>	<b><u>Week Due</u></b>
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	Week 7, Semester End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12
	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
<b>Required Books</b>			
<b>Required Text Books &amp; Reference Books:</b>			
1. Budd, T., <i>An Introduction to Object Oriented Programming</i> , Second Edition, Addison-Wesley, Pearson Education Asia, ISBN: 817808-228-4.			
2. E Balaguruswamy, <i>Object Oriented Programming with C++</i> , Third Edition			
3. R. Lafore, <i>Object Oriented Programming in Turbo C++</i> , Galgotia Publications Ltd. India, 1999			
4. Andrei Alexandrescu, <i>Modern C++ Design</i> , Addison-Wesley, 2001 Scott Meyers, <i>Effective Modern C++</i> , O’Reilly,			

### EUCSC-105- Database Management System

Course Title	Database Management System	Course Code	EUENG-105
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computing	Semester	Second
Level of Course	Introductory	Year of Study	First
Mode of Delivery	Standard	Lecturer	

Maximum Mark 100

Pass Mark 50

University Assessment 50%

Internal Assessment 50%

### Objectives of the Course:

Database Management Essentials provides the foundation you need for a career in database development, data warehousing, or business intelligence, as well as for the entire Data Warehousing for Business Intelligence specialization. In this course, you will create relational databases, write SQL statements to extract information to satisfy business reporting requests, create entity

### Learning Outcomes:

#### Knowledge and Understanding

Students successfully completing this course will be able to:

- analyze the data and data organization needs of organizations;
- apply the Entity-Relationship (E-R) Model for building information systems' data models;
- transform an E-R diagram into a relational model, and use normalization to create a database relational schema;
- discuss the physical database design process of producing an efficient and tuned database;
- explain when demoralization is preferred over normalization, and use vertical and horizontal partitioning for data distribution; □elaborate on data storage and indexing options, and perform query optimization;
- use SQL for database creation, manipulation, and control;
- explain the client/server model, and describe the key components used to implement internet database environments; □perform basic database administration tasks;
- Maintain strong relationships between data
- Update the system and the information
- How is Data sharing improved In The Organization? □Data Security & Effective Data Integration.
- Database Management Systems Minimize Data Inconsistency.

#### Subject specific skills

On successful completion of the module students will have demonstrated their ability to:

- Object.

- Class.
- Data Hiding and Encapsulation.
- Dynamic Binding.
- Message Passing. □ Inheritance.
- Polymorphism

#### Key Skills

- On successful completion of the module students will have demonstrated their ability to:
- Understanding data, information, databases, dbms
- Understanding the life cycle of the relational database
- Understanding data modelling w.r.t. ER modelling and Relational Modelling □Use of Structured Query Language (SQL)

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

**UNIT: 1**

**4 LH**

<b>Introduction to Database Systems:</b> This unit discusses the evolution of file processing systems, and introduces the role of databases in organizations. It also introduces the core components of a database environment. Brief History of DBMS & RDBMS, Advantage and Disadvantage of DBMS, Component of DBMS, Type of Database, View of data, Relational databases, Database architecture, Transaction management	
<b>UNIT 2</b>	<b>04 LH</b>
<b>Data Modelling: The Entity-Relationship Diagram:</b> This unit discusses the entity-relationship (E-R) diagram: how it may be used to model real-life situations, and its symbols and constructs. Introduction to Feasibility study, Gathering Requirement (Requirement Analysis), Concept of ER Diagram and their Relationship (Basic concept, Design process, E- R diagram, different types of entities and relationship, weak entity set, extended E- R features: Generalization, specialization, Aggregation, Reduction of E-R database Schema), DML class diagram	
<b>UNIT:3</b>	<b>4 LH</b>
<b>The Relational Model and Normalization:</b> This unit explains the relational model, normalization, and how to transform an entityrelationship data diagram into a relational model. Normalization, Table, Keys, Importance of normalization, Different type of normalization form (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), Constraints, Mapping class diagram to Relational Database	
<b>UNIT: 4</b>	<b>3 LH</b>
<b>Physical Database Design:</b> This unit introduces the physical design process, its steps, inputs, and outputs. Creation of table, Concept of data type, Key, Constraints, Store Procedure, Function, Inserting Records, updating records, views, query table with different parameters, Joins and their types, DDL, DML implementation via sql query language.	
<b>UNIT: 5</b>	<b>47 LH</b>
<b>SQL - A Standard Navigation Language for Relational Databases:</b> This unit provides a thorough presentation of the SQL language used by most database management systems. Sub Query, Union, Intersect, Self-Join and Data Extraction, PL\SQL programming, sequence generator, Sorting: Ascending, Descending, Random, Query set transpose, Trigger concept and implementation, query optimization trick and tips, Importing and Exporting data to different format, backup and restore Data type, SQL language: DDL, DML, DCL, TCL, DQL, create, Alter, Rename, Add Column, Insert, update, delete queries, distinct, order by, truncate and delete command difference, NULL value-IS NULL/IS NOT NULL, LIKE-LIKE with escape- NOT like escape, alias name, and/or/not, not in/in operator, Arithmetic operator, between operator, dual table, in-built function (string/char functions, numeric/math function, date/time function, conversion function, analytic function, Advanced function, grouping function), constraints with system table entry, group by, having by, joins (inner, left, right, full), set operators(union/union all/intersect/minus), any/all, case when, with clause, sub query/nested query and co- related sub-query, EXISTS/NOT EXISTS, view, index, sequence, materialized view.	
<b>UNIT:6</b>	<b>6 LH</b>
<b>Introduction to Two-Tier and Three-Tier Architectures, and the Internet Database Environment:</b> This unit introduces the Internet database environment, including Web-enabled databases, Web-enabled system design, and programming in two-tier and threetier architectures. It also discusses XML and data exchange on the Internet.	
<b>UNIT:7</b>	<b>5 LH</b>
<b>Introduction to Data Warehousing:</b> This unit introduces the fundamental concepts of data warehousing. The data warehouse architectures and OLAP tools are explained.	
<b>UNIT:8</b>	<b>5 LH</b>

**Data Quality and Database Administration:** This unit is devoted to data quality, data integration, and database administration. The roles of data administration and database administration, their function, and their importance to an information resource will be discussed.

**UNIT:9****5 LH**

**Overview of Object-Oriented Databases:** This unit introduces the object-oriented data model, and discusses the implementation of object persistence using relational databases.

**UNIT:10****3 LH**

Realization of the Knowledge. Real Time Database Design. Project Work and its Implementation.

**UNIT:11****4 LH**

Case Study

**PRACTICAL**

The module leader is free to design the lab assignments (in class and assignment). The module leader will have to design the lab assignments as follows:

- To cover each unit
- Lab duration is of 1.5 hours at least
- Each unit must be covered with 2 in class demonstration and 5-10 assignment covering of the unit. - Each lab must be equipped with Pre Report, Post Report and viva.
- The students will have to demonstrate the final exam of the practical

**Learning Activities and Teaching Methods:**

Interactive lectures; In-class writing workshops; Discussion with class participation

**Assessment Methods:**

Homework assignments (3), Research paper, Final Exam

DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES

STUDY HOURS

LECTURE

PRACTICAL / WORKSHOP

TUTOR CLASS PREPARATORY

WRITTEN ASSIGNMENT

EXAMINATION

45  
20  
40  
25  
20  
15  
35  
200

REVISION

SKILLS DEVELOPMENT

TOTAL

**ASSESSMENT STRUCTURE\***

Type of Assessment	Components	Weightage	Week Due
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	Week 7, Semester End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12

	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
<b>Required Books</b>			

**Required Text Books & Reference Books:**

- A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill ,Rob, Coroneel,
- "Database Systems", Seventh Edition, Cengage Learning
- Mark L. Gleeson, Paulraj Ponniah, Alex Krieger, Frank Miller, Boris Trukhnov; Introduction to Database Management; Wiley
- Kazumasa Yokota, Cooperative Databases and Applications, World Scientific, 1997, 981023161X,
- 9789810231613
- Ramez Elmasri, Fundamentals of Database Systems, Pearson Education India, 2008
- Rini Chakrabarti, Shilbhadra Dasgupta, ADVANCED DATABASE MANAGEMENT SYSTEM, Wiley India Pvt. Limited Won Kim, Modern Database Systems, ACM Press, 1995

**EUCSC-106- Digital Electronics & Logic Design**

Course Title	Digital Electronics & Logic Design	Course Code	EUENG-106
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computing	Semester	Second
Level of Course	Introductory	Year of Study	First
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

Database Management Essentials provides the foundation you need for a career in database development, data warehousing, or business intelligence, as well as for the entire Data Warehousing for Business Intelligence specialization. In this course, you will create relational databases, write SQL statements to extract information to satisfy business reporting requests, create entity

**Learning Outcomes:****Knowledge and Understanding**

Students successfully completing this course will be able to:

- analyze the data and data organization needs of organizations;
- apply the Entity-Relationship (E-R) Model for building information systems' data models;
- transform an E-R diagram into a relational model, and use normalization to create a database relational schema;
- discuss the physical database design process of producing an efficient and tuned database;
- explain when demoralization is preferred over normalization, and use vertical and horizontal partitioning for data distribution; □elaborate on data storage and indexing options, and perform query optimization;
- use SQL for database creation, manipulation, and control;

- explain the client/server model, and describe the key components used to implement internet database environments; □perform basic database administration tasks;
- Maintain strong relationships between data
- Update the system and the information
- How is Data sharing improved In The Organization? □Data Security & Effective Data Integration.
- Database Management Systems Minimize Data Inconsistency.

### Subject specific skills

On successful completion of the module students will have demonstrated their ability to:

- Object.
- Class.
- Data Hiding and Encapsulation.
- Dynamic Binding.
- Message Passing. □ Inheritance. Polymorphism

### Key Skills

- On successful completion of the module students will have demonstrated their ability to:
- Understanding data, information, databases, dbms
- Understanding the life cycle of the relational database
- Understanding data modelling w.r.t. ER modelling and Relational Modelling
- Use of Structured Query Language (SQL)

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

#### UNIT: 1

4 LH

**Introduction to Database Systems:** This unit discusses the evolution of file processing systems, and introduces the role of databases in organizations. It also introduces the core components of a database environment. Brief History of DBMS & RDBMS, Advantage and Disadvantage of DBMS, Component of DBMS, Type of Database, View of data, Relational databases, Database

architecture, Transaction management

#### UNIT 2

04 LH

**Data Modelling: The Entity-Relationship Diagram:** This unit discusses the entity-relationship (E-R) diagram: how it may be used to model real-life situations, and its symbols and constructs. Introduction to Feasibility study, Gathering Requirement (Requirement Analysis), Concept of ER Diagram and their Relationship (Basic concept, Design process, E- R diagram, different types of entities and relationship, weak entity set, extended E-R features: Generalization, specialization, Aggregation, Reduction of E-R database Schema), DML class diagram

#### UNIT:3

4 LH

**The Relational Model and Normalization:** This unit explains the relational model, normalization, and how to transform an entityrelationship data diagram into a relational model. Normalization, Table, Keys, Importance of normalization, Different type of normalization form (1NF, 2NF, 3NF, BCNF, 4NF, 5NF), Constraints, Mapping class diagram to Relational Database

#### UNIT: 4

3 LH

**Physical Database Design:** This unit introduces the physical design process, its steps, inputs, and outputs. Creation of table, Concept of data type, Key, Constraints, Store Procedure, Function, Inserting Records, updating records, views, query table with different parameters, Joins and their types, DDL, DML

implementation via sql query language.

**UNIT: 5****47 LH**

**SQL - A Standard Navigation Language for Relational Databases:** This unit provides a thorough presentation of the SQL language used by most database management systems.

Sub Query, Union, Intersect, Self-Join and Data Extraction, PL\SQL programming, sequence generator, Sorting: Ascending, Descending, Random, Query set transpose, Trigger concept and implementation, query optimization trick and tips, Importing and Exporting data to different format, backup and restore

Data type, SQL language: DDL, DML, DCL, TCL, DQL, create, Alter, Rename, Add Column, Insert, update, delete queries, distinct, order by, truncate and delete command difference, NULL value-IS NULL/IS NOT NULL, LIKE-LIKE with escape- NOT like escape, alias name, and/or/not, not in/in operator, Arithmetic operator, between operator, dual table, in-built function (string/char functions, numeric/math function, date/time function, conversion function, analytic function, Advanced function, grouping function), constraints with system table entry, group by, having by, joins (inner, left, right, full), set operators(union/union all/intersect/minus), any/all, case when, with clause, sub query/nested query and co- related sub-query, EXISTS/NOT EXISTS, view, index, sequence, materialized view.

**UNIT:6****6 LH**

**Introduction to Two-Tier and Three-Tier Architectures, and the Internet Database Environment:** This unit introduces the Internet database environment, including Web-enabled databases, Web-enabled system design, and programming in two-tier and threetier architectures. It also discusses XML and data exchange on the Internet.

**UNIT:7****5 LH**

**Introduction to Data Warehousing:** This unit introduces the fundamental concepts of data warehousing. The data warehouse architectures and OLAP tools are explained.

**UNIT:8****5 LH**

**Data Quality and Database Administration:** This unit is devoted to data quality, data integration, and database administration. The roles of data administration and database administration, their function, and their importance to an information resource will be discussed.

**UNIT:9****5 LH**

**Overview of Object-Oriented Databases:** This unit introduces the object-oriented data model, and discusses the implementation of object persistence using relational databases.

**UNIT:10****3 LH**

Realization of the Knowledge. Real Time Database Design. Project Work and its Implementation.

**UNIT:11****4 LH**

Case Study

**PRACTICAL**

The module leader is free to design the lab assignments (in class and assignment). The module leader will have to design the lab assignments as follows:

- To cover each unit
- Lab duration is of 1.5 hours at least
- Each unit must be covered with 2 in class demonstration and 5-10 assignment covering of the unit. - Each lab must be equipped with Pre Report, Post Report and viva.
- The students will have to demonstrate the final exam of the practical

**Learning Activities and Teaching Methods:**

Interactive lectures; In-class writing workshops; Discussion with class participation **Assessment Methods:**



Homework assignments (3), Research paper, Final Exam			
DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES			STUDY HOURS
LECTURE			
PRACTICAL / WORKSHOP			
TUTOR CLASS PREPARATORY			
WRITTENT ASSIGNMENT			
EXAMINATION			<div>45</div> <div>20</div> <div>40</div> <div>25</div> <div>20</div> <div>15</div> <div>35</div> <div>200</div>
REVISION			
SKILLS DEVELOPMENT			
TOTAL			
<b>ASSESSMENT STRUCTURE*</b>			
<b>Type of Assessment</b>	<b>Components</b>	<b>Weightage</b>	<b>Week Due</b>
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	Week 7, Semester End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12
	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
<b>Required Books</b>			
<b>Required Text Books &amp; Reference Books:</b> <ul style="list-style-type: none"> <li>A Silberschatz, H Korth, S Sudarshan, “Database System and Concepts”, fifth Edition McGraw-Hill ,Rob, Coronei,</li> <li>“Database Systems”, Seventh Edition, Cengage Learning</li> <li>Mark L. Gleeson, Paulraj Ponniah, Alex Krieger, Frank Miller, Boris Trukhnov; Introduction to Database Management; Wiley</li> <li>Kazumasa Yokota, Cooperative Databases and Applications, World Scientific, 1997, 981023161X,</li> <li>9789810231613</li> <li>Ramez Elmasri, Fundamentals of Database Systems, Pearson Education India, 2008</li> <li>Rini Chakrabarti, Shilbhadra Dasgupta, ADVANCED DATABASE MANAGEMENT SYSTEM, Wiley India Pvt. Limited Won Kim, Modern Database Systems, ACM Press, 1995</li> </ul>			

### EUCSC-106- Digital Electronics & Logic Design

<b>Course Title</b>	Digital Electronic and Logic Design	<b>Course Code</b>	<b>EUENG-106</b>
ECTS Credits	6	Language of Instruction	English

Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Electronic	Semester	Second
Level of Course	Introductory	Year of Study	First
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

**Combinational Logic.** Students will be able to analyze and do some simple design of combinational logic. They will be familiar with and incorporate into circuits the basic gates, decoders, encoders, multiplexers, demultiplexers, adders and subtract or **Sequential Logic.** Students will be able to analyze and do some simple design of sequential logic. They will be familiar with and incorporate into circuits the latches, flip-flops, and counters.

**Hardware.** Students will examine the various logic gates and circuits in the laboratory. They will design, build and troubleshoot logic circuits in the laboratory

**Professionalism, Professional Societies and Lifelong Learning.** Appreciate the value of professionalism in your class work, projects and career as well as the usefulness of, and role of professional societies in, lifelong learning.

### Learning Outcomes:

#### Knowledge and Understanding

Students successfully completing this course will be able to:

- use binary arithmetic,
- learn the principles of digital hardware and support given by it to the software,
- explain the operation and design of combinational and arithmetic logic circuit,
- design hardware for real world problems,
- design a combinatorial logic circuit that solves binary logical tasks,
- design a sequential circuit that solves binary logical tasks,
- describe the structure of a logic gate,
- explain the principles of programmable circuits,
- explain the principles of analog-to-digital (AD) - and digital-to-analog (DA) conversion,
- design synchronous networks with sequential flow charts,
- design sequential circuits for programmable logic device (PLD) circuits,
- program a microcomputer and describe the code with logic

#### Subject specific skills

On successful completion of the module students will have demonstrated their ability to:

- Object.
- Class.
- Data Hiding and Encapsulation.
- Dynamic Binding.
- Message Passing. □ Inheritance.

Polymorphism

**Key Skills**

- On successful completion of the module students will have demonstrated their ability to:
- Understanding data, information, databases, dbms
- Understanding the life cycle of the relational database
- Understanding data modelling w.r.t. ER modelling and Relational Modelling □Use of Structured Query Language (SQL)

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

<b>UNIT: 1</b>	<b>4 LH</b>
Definition of Digital Signals, Digital waveforms, Digital Logic, Moving and storing digital information, digital operation; Digital computer and digital systems, Block diagram of Digital computer, Advantage and Disadvantage of Digital System; Binary, Decimal, Octal and Hexadecimal Number System; Conversion of Number system, Complements, Completion methods of addition and subtraction; Codes (BCD codes, error-detection codes, ASCII, Gray codes, EBCDIC, Excess-3 code), Binary storage and register, Binary logics; Basic definition, Axiomatic definition of Boolean Algebra, Minterms, Maxterms; Basic theorem and properties of Boolean Algebra; Simplification of Boolean functions using SOP and POS; Logic operations, Digital logic gates, IC digital logic families	
<b>UNIT 2</b>	<b>04 LH</b>
Design Concepts – Digital Hardware, Design process, Design of digital hardware Introduction to logic circuits – Variables and functions, Logic gates and networks. Boolean algebra, Synthesis using AND, OR, and NOT Gates, Design examples. Optimized implementation of logic functions – Karnaugh Map, Don't Care Condition, Tabulation Method, Strategies for minimization, minimizing Product-of-Sum Forms, Incompletely Specified functions, multiple output circuits. NAND and NOR logic implementation, Universal gate Realization, Introduction to CAD tools	
<b>UNIT:3</b>	<b>4 LH</b>
Programmable logic devices: general structure of a Programmable Logic Array (PLA), gate level diagram, schematic diagram, Programmable Array Logic (PAL) Structure of Adder, 2-input and 3-input lookup tables (LUT). Design of Arithmetic-circuits, Arithmetic-circuits Combinational circuit building blocks –Parallel Adder, Decoder, Encoder, Multiplexers, Decoders, Encoders, Code converters, Arithmetic comparison circuits. Parity Generator and Checker. Concept of ROM	
<b>UNIT: 4</b>	<b>3 LH</b>
Basic Latch Gated SR Latch, Gated D Latch, Master-Slave and Edge- Triggered D Flip-Flops, T Flip-flop, JK Flip-flop, Excitation tables. Registers-Shift Register, Counters-Asynchronous and synchronous counters, Ring counter, Johnson counter, VHDL code for D Flipflop and Up-counter, Registers (Serial In – Serial Out, Serial in Parallel Out, Parallel In parallel Out, application	
<b>UNIT: 5</b>	<b>47 LH</b>
Synchronous Sequential Circuits – Basic design steps. Moore and Mealy state model, State minimization, Design of a Counter using the Sequential Circuit Approach. Algorithmic State Machine (ASM) charts	
<b>UNIT:6</b>	<b>6 LH</b>
Asynchronous Sequential Circuits – Behaviour, Analysis, Synthesis, State reduction, State Assignment, examples. Hazards: static and dynamic hazards. Significance of Hazards. Clock skew, set up and hold time of a flip-flop	

<b>UNIT:7</b>	<b>5 LH</b>
Case Study	
<p><b>PRACTICAL</b></p> <p>The module leader is free to design the lab assignments (in class and assignment). The module leader will have to design the lab assignments as follows:</p> <ul style="list-style-type: none"> <li>- To cover each unit</li> <li>- Lab duration is of 1.5 hours at least</li> <li>- Each unit must be covered with 2 in class demonstration and 5-10 assignment covering of the unit. - Each lab must be equipped with Pre Report, Post Report and viva.</li> <li>- The students will have to demonstrate the final exam of the practical</li> </ul> <p><b>LABS</b></p> <ol style="list-style-type: none"> <li>1. DeMorgan's law and its familiarization with NAND and NOR gates</li> <li>2. Design of Half adder, full adder, Subtractor using basic logic gates</li> <li>3. Study and verification of 3-8 decoder using IC</li> <li>4. Study and verification of 8-3 encoder using IC</li> <li>5. Study and verification of 4-1 Mux using IC</li> <li>6. Study and Verification of 1-4 DeMux using IC</li> <li>7. Latches, RS, Master-Slave and T type flip flops</li> <li>8. D and JK type flip flops</li> <li>9. Ripple counter, Synchronous counter</li> <li>10. Familiarization with computer package for logic circuit design</li> <li>11. Design digital circuits using hardware and software tools</li> <li>12. Use of PLAs and PLDs</li> <li>13. Design and Verification of Shift Register</li> <li>14. Implementation of 7 segment display</li> </ol>	
<p><b>JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY*:</b> Ideas introduced and developed in lectures and seminars will be reinforced through the use of applied problems so that students can, in groups and on an individual basis, develop their skills, knowledge and understanding. The module will be delivered through a combination of lectures, seminars and practical classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:</p>	
<p><b>Learning Activities and Teaching Methods:</b></p> <p>Interactive lectures; In-class writing workshops; Discussion with class participation</p> <p><b>Assessment Methods:</b></p> <p>Homework assignments (3), Research paper, Final Exam</p>	
DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
LECTURE	
PRACTICAL / WORKSHOP	
TUTOR CLASS PREPARATORY	
WRITTENT ASSIGNMENT	

EXAMINATION		45
		20
		40
		25
		20
		15
		35
		200
REVISION		
SKILLS DEVELOPMENT		
TOTAL		
<b>ASSESSMENT STRUCTURE*</b>		
<b>Type of Assessment</b>	<b>Components</b>	<b>Weightage</b>
Written Test (50%) – Theory	Final University Examination	50
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10
	Assignment 1	5
	Assignment 2	5
	Assignment 3	5
	Assignment 4	5
	MCQ Tests (3, 5 each)	15
	Attendance (Min. 85%)	5
<b>Required Books</b>		
<b>Required Text Books &amp; Reference Books:</b> <ol style="list-style-type: none"> <li>1. Digital Principles and Application by Malvino and Leach, THI- 1999</li> <li>2. Digital system Design using VHDL, Charles H. Roth, Thomson, 2002</li> <li>3. Stephen Brown, Zvonko Vranesic, “Fundamentals of Digital Logic with VHDL Design”, 2<sup>nd</sup> Edition, McGraw Hill, 2009.</li> <li>4. Jain R.P., “Modern Digital Electronics,” 3<sup>rd</sup> Edition, TMH, 2003.</li> <li>5. John F. Wakerly, “Digital Design Principles &amp; Practices”, 3<sup>rd</sup> Edition, Prentice Hall, 2001</li> <li>6. M. Morris Mano, Charles R. Kime, “Logic and Computer Design Fundamentals”, 2<sup>nd</sup> Edition, Pearson Education Asia, 2001.</li> <li>7. ZVI Kohavi, Switching and Finite Automata Theory, 2<sup>nd</sup> Edition, Tata McGraw Hill, 1995. William I Fletcher, “An Engineering Approach to Digital Design”, Eastern Economy Edition, PHI,</li> <li>8. H.T. Nagle, “Introduction to Computer Logic”, Prentice Hall,</li> </ol>		

# Third Semester

SN	Course Code	Course Title	ECTS Credits
1	EUMTH-253	Numerical Methods	6
2	EUCSC-201	Data Structure & Algorithm	6
3	EUCSC-202	Network Analysis & Design	6
4	EUCSC-203	Routing and Switching Essentials	6
5	EUCSC-204	Organization and Management	6
		Total	30

**EUMTH-253-Numerical Methods**

Course Title	Numerical Method	Course Code	EUMTH-253
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major Field
		Mathematics	Semester
		Third	
Level of Course	Introductory	Year of Study	Second
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**RESTRICTIONS:**

This module is restricted to Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security, Bachelor of Computer Science in (Software Engineering / Web Development / IT management).

**SUPPLEMENTARY REGULATIONS:** This module has no supplementary regulations

**MODULE SUMMARY:** This subject offers an higher introduction to mathematics oriented toward computer science and engineering. The subject coverage is divided into three parts:

- Fundamental concepts of Numeric methods: Definitions, proofs, sets, functions.
- Discrete structures: Elementary number theory, graphs, counting.
- Discrete Taylor theory. **Course objective**

Upon completion of this module, students will be able to explain and apply basic knowledge for Numerical methods in computer science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.

In particular, students will be able to:

- Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones; synthesize elementary proofs, especially proofs by induction.
- Model and analyze computational processes using analytic and combinatorial methods.
- Apply principles of discrete probability to calculate probabilities and expectations of simple random processes.
- Work in small teams to accomplish all the objectives above.

**LEARNING OUTCOMES\*:**

At the end of this course, students will be able to:

- Use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions, and integers.
- Evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
- Synthesize induction hypotheses and simple induction proofs.
- Prove elementary properties of modular arithmetic and explain their applications in computer science, for example, in cryptography and hashing algorithms.
- Apply graph-theoretic models of data structures and state machines to solve problems of connectivity and constraint satisfaction (e.g. scheduling).
- Apply the method of invariants and well-founded ordering to prove correctness and termination of processes and state machines.

- Derive closed-form and asymptotic expressions from series and recurrences for growth rates of processes.
- Calculate numbers of possible outcomes of elementary combinatorial processes such as permutations and combinations.
- Calculate probabilities and discrete distributions for simple combinatorial processes; calculate expectations. ➤ Problem solve and study in a small team with fellow students.

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

<b>UNIT: 1</b>	<b>12 LH</b>
Review of calculus and Taylor's theorem, Errors in numerical calculations, Trial and error method, Half- interval method, and convergence, Newton's method, secant method and their convergence, Fixed point iteration and its convergence, Newton's method for polynomials and Horner's method, Lagrang's polynomials, Newton's interpolation using difference and divided differences, Cubic spline interpolation, Least squares method for linear and nonlinear data	
<b>UNIT:2</b>	<b>6 LH</b>
Numerical integration: General Quadrature formula – Trapizoidal rule, Simpson's 1/3 rule, Euler-Maclaurin's formula, Stirling's formula for factorial n – Summation of series by Euler – Maclaurin's formula.	
<b>UNIT:3</b>	<b>9 LH</b>
Solutions of transcendental and polynomial equations in one variable: Method of iteration – Newton-Raphson method – Regula Falsi method – Successive bisection method. Solution of linear equation: Gauss reduction method – Exchange method – Jacobi iteration method – Gauss-Seidel method.	
<b>UNIT: 4</b>	<b>9 LH</b>
Review of partial differential equations, Deriving difference equations, Laplacian equation and Poisson's equation, engineering examples Laboratory works: The laboratory experiments will consist of program development and testing of non-linear equations, interpolation, numerical integration and differentiation, linear algebraic equations, ordinary and partial differential equations.	
<b>UNIT: 5</b>	<b>9 LH</b>
Methods of curve fitting: Least square analysis – Matrix inversion – Gauss elimination method – Co-factor method – Partition method.	
<b>JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY*:</b> Ideas introduced and developed in lectures and seminars will be reinforced through the use of applied problems so that students can, in groups and on an individual basis, develop their skills, knowledge and understanding.  The module will be delivered through a combination of lectures, seminars and practical classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:	
<b>DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES</b>	<b>STUDY HOURS</b>
LECTURE	<u>45</u>
PRACTICAL / WORKSHOP	<u>20</u>
TUTOR CLASS PREPARATORY	<u>40</u>
WRITTENT ASSIGNMENT	<u>25</u>
EXAMINATION	<u>20</u>
REVISION	<u>15</u>
SKILLS DEVELOPMENT	<u>35</u>



TOTAL			<u>200</u>
CONTEXT*:			
This module is delivered in a face to face guided tutor form to student cohort(s) taught by the faculties			
ASSESSMENT STRUCTURE*			
Type of Assessment	Components	Weightage	Week Due
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	Week 7, Semester End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12
	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
Required Books			
<div>➤ J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill – 1997</div> <div>➤ Kenneth H. Rosen – Discrete Mathematics and its Application – 5<sup>th</sup> Edition, McGraw Hill, 2003.</div> <div>➤ B.S. Grewal, <i>Higher Engineering Mathematics</i>, Khanna Publications, 40th Edition, 2008</div> <div>➤ N. Bali, M.Goyal, C.Watkins, <i>Advanced Engineering Mathematics</i></div>			

### EUCSC-201- Data Structure & Algorithm

<b>Course Title</b>	Data Structure & Algorithm	<b>Course Code</b>	<b>EUCSC-201</b>
ECTS Credits	6	Language of	English
	Instruction		
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	Computer system	Type of Course	Major
Field	Mathematics	Semester	Third
Level of Course	Introductory	Year of Study	Second
Mode of Delivery	Standard	Lecturer	
Maximum Mark	100	Pass Mark	50

Internal		50%	
University Assessment	50%	Assessment RESTRICTIONS:	

This module is restricted to Bachelor of Computer Science (Hons.) in Network Technology and Cyber Security, Bachelor of Computer Science in (Software Engineering / Web Development / IT management).

SUPPLEMENTARY REGULATIONS: This module has no supplementary regulations

**MODULE SUMMARY:** This subject offers an higher introduction to mathematics oriented toward computer science and engineering. The subject coverage is divided into three parts:

- To provide basic of data structure and algorithm
  - To provide knowledge about use of stack and queue
- Course objective**

Upon completion of this module, students will be able to explain and apply basic knowledge for Numerical methods in computer science. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.

In particular, students will be able to:

- To provide basic of data structure and algorithm
- To provide knowledge about use of stack and queue

#### LEARNING OUTCOMES\*:

At the end of this course, students will be able to:

- Able to use tree and graph for search purpose
- Able to use different algorithm according to need

**INDICATIVE CONTENT (SYLLABUS):** This module introduces students to the concepts necessary to use a modern computer system. The module will also consider ethical and social aspects and their influence on the use and selection of computer systems. In particular, the following topics will be addressed:

**UNIT: 1** **12 LH**

**Data Structures Basics:** Structure and Problem Solving, Data structures, Data structure Operations, Algorithm: complexity, Time- space tradeoff.

**UNIT:2** **6 LH**

**Linked List: Introduction,** Linked lists, Representation of linked lists in Memory, Traversing a linked list, Searching a linked list, Memory allocation and Garbage collection, insertion into linked list, Deletion from a linked list, Types of linked list.

**UNIT:3** **9 LH**

**Stack and Queue:** Introduction, Array Representation of Stack, Linked List Representation of stack, Application of stack, Queue, Array Representation of Queue, Linked List Representation of Queue.

**UNIT: 4** **9 LH**

**Trees:** Definitions and Concepts, Operations on Binary Trees, Representation of binary tree, Conversion of General Trees to Binary Trees, Sequential and Other Representations of Trees, Tree Traversal.

**UNIT: 5** **9 LH**

**Graphs:** Matrix Representation of Graphs, List Structures, Other Representations of Graphs, Breadth First Search, Depth First Search, Spanning Trees.

**UNIT: 6** **9 LH**

**Directed Graphs** Types of Directed Graphs; Binary Relation As a Digraph; Euler's Digraphs; Matrix Representation of Digraphs.

**UNIT: 7** **9 LH**

**Applications of Graphs:** Topological Sorting, Shortest-Path Algorithms – Unweighted Shortest Paths – Dijkstra's Algorithm, Minimum spanning tree- Prim's Algorithm, Introduction to NP-Completeness.

**UNIT: 8** **9 LH**

**Searching Techniques:** Sequential Searching, Binary Searching, Search Trees, Hash- Table Methods.

**UNIT: 9** **9 LH**

**Elementary Algorithms:** Notation for Expressing Algorithms; Role and Notation for Comments; Example of an Algorithm; Problems and Instances; Characteristics of an Algorithm; Building Blocks of Algorithms; Procedure and

Recursion – Procedure, Recursion; Outline of Algorithms; Specification Methods for Algorithms.

**UNIT: 10** **9 LH**

**Mathematical Functions** and Notations Functions and Notations; Modular Arithmetic / Mod Function; Mathematical

Expectation in Average Case Analysis; Efficiency of an Algorithm; Well Known Asymptotic Functions and Notations; Analysis of Algorithms – Simple Examples; Well Known Sorting Algorithms – Insertion sort, Bubble sort, Selection sort, Shell sort, Heap sort.

**UNIT: 11** **9 LH**

**Divide and Conquer** Divide and Conquer Strategy; Binary Search; Max. And Min.; Merge sort; Quick sort.

**UNIT: 12** **9 LH**

**Greedy Method** Greedy Method Strategy; Optimistic Storage on Tapes; Knapsack Problem; Job Sequencing with Deadlines; Optimal Merge Pattern; Single Source Shortlist Paths.

**JUSTIFICATION OF TEACHING, LEARNING AND ASSESSMENT STRATEGY\*:** Ideas introduced and developed in lectures and seminars will be reinforced through the use of applied problems so that students can, in groups and on an individual basis, develop their skills, knowledge and understanding.

The module will be delivered through a combination of lectures, seminars and practical classes. The actual mix of lectures and seminars at any particular time will be dependent on the level of difficulty of the material being covered, but an indicative mix is as follows:

DELIVERY MODEL: TEACHING, LEARNING + ASSESSMENT ACTIVITIES	STUDY HOURS
LECTURE	<u>45</u>
PRACTICAL / WORKSHOP	<u>20</u>
TUTOR CLASS PREPARATORY	<u>40</u>
WRITTEN ASSIGNMENT	<u>25</u>
EXAMINATION	<u>20</u>
REVISION	<u>15</u>
SKILLS DEVELOPMENT	<u>35</u>
TOTAL	<u>200</u>

**CONTEXT\*:**

This module is delivered in a face to face guided tutor form to student cohort(s) taught by the faculties

**ASSESSMENT STRUCTURE\***

Type of Assessment	Components	Weightage	Week Due
Written Test (50%) – Theory	Final University Examination	50	Semester End
Course Work (50%)	Term Examinations (2, Mid Term and Term End)	10	Week 7, Semester End
	Assignment 1	5	4
	Assignment 2	5	8
	Assignment 3	5	12
	Assignment 4	5	16
	MCQ Tests (3, 5 each)	15	7, 14
	Attendance (Min. 85%)	5	Semester End
<b>Required Books</b>			

- J.P. Tremblay, R. Manohar, Discrete Mathematical Structure with Application to Computer Science, McGraw Hill – 1997
- Kenneth H. Rosen – Discrete Mathematics and its Application – 5<sup>th</sup> Edition, McGraw Hill, 2003.
- B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publications, 40th Edition, 2008
- N. Bali, M.Goyal, C.Watkins, *Advanced Engineering Mathematics*

## EUCSC-202 Network Analysis & Design

Course Title	Network Analysis & Design	Course Code	EUCSC-202
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Majaor
Field	Networking	Semester	Third
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

The main objectives of the course are to:

- To provide basic of Network
- To provide knowledge about Network Analysis
- To provide about network design

**Learning Outcomes:** After completion of the course students are expected to be able to:

- Able to use different requirement gathering method
- Able to develop supplemental performance requirement

### Course Content:

#### Unit-1- Introduction

Overview of Analysis, Architecture, and Design Processes, Process Components, Tactical and Strategic Significance, Hierarchy and Diversity, Importance of Network Analysis, Model for Network Analysis, Architecture, and Design, Service Characteristics (Service Levels, System Components and Network Services, Service Requests and Requirements, Service Offerings, Service Metrics), Performance Characteristics (Capacity, Delay, RMA, Performance Envelopes)

#### Unit-2 Requirement Analysis: Concept and Process

Requirements and Features, the Need for Requirements Analysis, User Requirements, Application Requirements, Application Types, Application Groups, Application Locations, Device Requirements (Device

Types, Performance Characteristics, Device Locations), Network Requirements (Existing Networks and Migration, Network Management and Security)

#### Unit-3 Requirement Analysis: Concept and Process (Cont.)

Gathering and Listing Requirements (Determining Initial Conditions, Setting Customer Expectations, Working with Users, Taking Performance Measurements, Tracking and Managing Requirements,

<p>Mapping Location Information), Developing Service Metrics (Measurement Tools, Where to Apply Service Metrics), Characterizing Behavior (Modeling and Simulation, User Behavior ,Application Behavior), Developing RMA Requirements (Reliability, Maintainability , Availability, Thresholds and Limits ), Developing Delay Requirements (End-to-End and Round-Trip Delays, Delay Variation), Developing Capacity Requirements (Estimating Data Rates)</p>	
<p><b>Unit-4 Requirement Analysis: Concept and Process (Cont.)</b></p> <p>Developing Supplemental Performance Requirements (Operational Suitability, Supportability, Confidence ), Environment-Specific Thresholds and Limits (Comparing Application Requirements), Requirements for Predictable and Guaranteed Performance (Requirements for Predictable Performance, Requirements for Guaranteed Performance), Requirements Mapping, Developing the Requirements Specification</p>	
<p><b>Unit-5 Flow Analysis</b></p> <p>Flows ( Individual and Composite Flows, Critical Flows ,Identifying and Developing Flows, Focusing on a Particular Application, Developing a Profile, Choosing the Top N Applications ), Data Sources and Sinks, Flow Models (Peer-to-Peer, Client–Server(Hierarchical Client–Server, Distributed-Computing)), Flow Prioritization, The Flow Specification( Flowspec Algorithm Capacity and Service Planning)</p>	
<p><b>Unit 6 Network Design</b></p> <p>Design Concepts (Analogy to a Building Design, Design Products, Input to the Design), Design Process, Vendor, Equipment, and Service-Provider Evaluations ( Seeding the Evaluation Process, Candidate Discussions, Data Gathering, Criteria Refinement and Ratings Development, Ratings and Prioritization, Modifying the Set of Candidates, Determining the Order of Evaluations), Network Layout (Logical Diagrams, Network Blueprints, Component Plans, Design Traceability, Design Metrics)</p>	
<p><b>Unit 7. Case Studies</b></p> <p>Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.</p>	<p><b>20 Hrs.</b></p>
<p><b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b></p>	
<p><b>Laboratory Work:</b></p> <p>Practical of subject is done based on the theory of lecture.</p>	
<p><b>Reference books :</b></p> <ul style="list-style-type: none"> <li>➤ <i>Cloud Computing: Implementation Management and Security</i>, John W. Rittinghouse and James F. Ransome (Recommended for Unit 1, 2, 3 4) <i>Joseph Davies: Understanding IPv6</i>; eastern economy edition</li> <li>➤ <i>Cloud Application architecture</i>, George Reese (Recommended for Unit 4)<i>S. A. Thomas: IPng and the TCP/IP Protocols</i>, Wiley, 1995</li> </ul>	

**EUCSC-203 Routing and Switching Essentials**

<b>Course Title</b>	<b>Routing and Switching Essentials</b>	<b>Course Code</b>	<b>EUCSC-203</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Networking	Semester	Third
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- To provide basic of routing and switching
- To provide knowledge about IPv4 and IPv6

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- Able to use different Network infrastructure
- Able to analysis different security measures in a network

**Course Content:****Unit-1 Network Fundamentals****(5 Hrs)**

OSI and TCP/IP models , TCP and UDP protocols , infrastructure components in an enterprise network ,Firewalls, Access points , Wireless controllers , cloud resources on enterprise network architecture , Traffic path to internal and external cloud services , Virtual services ,Basic virtual network infrastructure, three-tier architectures, network topologies (Star, Mesh, Hybrid)

**Unit-2 IPv6****(5 Hrs)**

IPv4 addressing and subnetting, IPv4 address types (Unicast, Broadcast, Multicast ), private IPv4 addressing

**Unit-3 IPv6****(6 Hrs)**

Line Organization – Advantages and dis – advantages, Functional Organization – Advantages and dis – advantages, Line and Staff Organization – Advantages and dis – advantages, Committee Organization – Advantages and disadvantages

**Unit-4 LAN Switching Technologies****(6 Hrs)**

Describe and verify switching concepts (MAC learning and aging, Frame switching, Frame flooding, MAC address table, Ethernet frame format, interface and cable issues (collisions, errors, duplex, speed), spanning multiple switches,

Access ports (data and voice), Default VLAN

**Unit-5 Inters witch connectivity****(6 Hrs)**

Interswitch connectivity (Trunk ports, Add and remove VLANs on a trunk, DTP, VTP (v1&v2), and 802.1Q , Native VLAN

), STP protocols, PortFast ,BPDU guard, switch stacking and chassis aggregation

**Unit-6 Routing Technologies****(6 Hrs)**

Routing concepts (Packet handling along the path through a network, Forwarding decision based on route lookup , Frame rewrite), Routing table (Prefix, Network mask, Next hop, Routing protocol code, Administrative distance , Metric, Gateway of last resort), Static routing and dynamic routing, distance vector and link state routing protocols , interior and exterior routing protocols, IPv4 and IPv6 static routing (Default route, Network route), RIP, EIGRP

**Unit- 7 WAN Technologies****(6 Hrs)**

PPP and MLPPP on WAN interfaces using local authentication ,WAN topology options (Point-to-point, Hub and spoke, Full mesh, Single vs dual-homed) ,WAN access connectivity options (MPLS, Metro Ethernet, Broadband PPPoE

,Internet VPN (DMVPN, site-to-site VPN, client VPN) ), Shaping, Policing, Congestion Management

**Unit- 8 Infrastructure Services and Security****(5 Hrs)**

Introduction, Qualities of a good Leader, Leadership Style, Blakes and Mouton's Managerial Grid, Leadership Approach, Leadership Theories.

**Unit 9. Case Studies****20 Hrs.**

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National

Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

**INTERNAL ASSESSMENT / PRACTICAL SESSIONS****Laboratory Work:**

Practical of subject is done based on the theory of lecture.

**Reference books :**

- CCNA Routing and Switching ICND2 200-105 Official Cert Guide by Wendell Odom
- Cisco Frame Relay Solutions Guide (Chin: Cisco Press, ISBN# 1587051168) Cisco LAN Switching (Clark, Hamilton, ISBN# 1578700949)

**EUCSC-204 Organization and Management**

Course Title	Organization and Management	Course Code	EUCSC-204
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Networking	Semester	Third
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			

<p>The main objectives of the course are to:</p> <ul style="list-style-type: none"> <li>➤ To provide basic of Organization and Management</li> <li>➤ To provide knowledge about Theory of Management</li> </ul>	
<p><b>Learning Outcomes:</b></p> <p>After completion of the course students are expected to be able to:</p> <ul style="list-style-type: none"> <li>➤ Able to use different structure of organization</li> <li>➤ Able to analysis different motivation and leadership style</li> </ul>	
<p><b>Course Content:</b></p>	
<p><b>Unit-1 Foundation of Organization and Management</b></p> <p>Introduction to Organization and Management, System approach applied to Organization, Necessity of Organization, Principles of Organization, Formal and Informal Organizations, Organizational Culture and Behavior, Functions of Management, Levels of Management, Managerial Skills, Importance of Management, Models of Management</p>	<p><b>(5 Hrs)</b></p>
<p><b>Unit- 2 Theory of Management</b></p> <p>Scientific Management Approach, Administrative Management Approach, Behavioral Management Approach, Modern Management Theories</p>	<p><b>(5 Hrs)</b></p>
<p><b>Unit-3 Organizational Structure</b></p> <p>Line Organization – Advantages and disadvantages, Functional Organization – Advantages and disadvantages, Line and Staff Organization – Advantages and disadvantages, Committee Organization – Advantages and disadvantages</p>	<p><b>(6 Hrs)</b></p>
<p><b>Unit-4 Forms of Ownership</b></p> <p>Single Ownership – Advantages and limitations, Partnership – Types of Partners – Advantages and limitations, Joint Stock Company – Formation of Joint Stock Company – Advantages and limitations, Co – operative Societies – Types of Co – operatives – Advantages and limitations, Public Corporations – Advantages and limitations</p>	<p><b>(6 Hrs)</b></p>
<p><b>Unit-5 Purchasing and Marketing Management</b></p> <p>Purchasing – Introduction, Functions of Purchasing Department, Methods of Purchasing, Marketing – Introduction, Functions of Marketing, Advertising</p>	<p><b>(6 Hrs)</b></p>
<p><b>Unit-6 Personal Management</b></p> <p>Introduction, Functions of Personal Management, Development of Personal Policy, Manpower Planning, Recruitment and Selection of manpower – Scientific selection, Training and Development of manpower, Job Analysis, Job Evaluation and Merit Rating, Wages and Incentives</p>	<p><b>(6 Hrs)</b></p>
<p><b>Unit-7 Motivation</b></p> <p>Human needs ( Maslow's Hierarchy of needs, Motivation – Introduction, Types of Motivation, Attitude Motivation; Group Motivation; Executive Motivation, Techniques of Motivation ) Motivation Theories ( McGregor's Theory X – Y, Fear and Punishment Theory, Alderfer's ERG Theory, MacClelland's Theory of learned needs, Herzberg's Hygiene Maintenance Theory, Vroom's Expectancy/ Valency Theory)</p>	<p><b>(6 Hrs)</b></p>
<p><b>Unit-8 Leadership</b></p> <p>Introduction, Qualities of a good Leader, Leadership Style, Blakes and Mouton's Managerial Grid, Leadership</p>	<p><b>(5 Hrs)</b></p>



Approach, Leadership Theories.	
<b>Unit 9. Case Studies</b>	<b>20 Hrs.</b>
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Practical of subject is done based on the theory of lecture.	
<b>Reference books :</b>	
<ul style="list-style-type: none"><li>➤ Organizational Management: Approaches and Solutions by Peter Stokes</li><li>➤ Organizational Perception Management by Kimberly D. Elsbach</li></ul>	

# Fourth Semester

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-205	Probability and Statistics	6
2	EUCSC-206	Network Operating System	6
3	EUCSC-207	Network and System Administration	6
4	EUCSC-208	Client Server Computing	6
5	EUCSC-209	Wireless and Mobile Communication	6
		Total	30

## EUCSC-205: Probability and Statistics

Course Title	Probability and Statistics	Course Code	EUCSC-205
ECTS Credits	6	Language of Instruction	English
Department	Math	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Fourth
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

The main objectives of the course are to:

- To provide basic of Random Variables and Mathematical Expression
- To provide knowledge about Correlation and Regression
- Statistics is a course in the methods for gathering, analyzing, and interpreting data.
- Analyze data in any number of forms. Summary statistics, for example, provide an overview of a data set, such as the average score on an exam.
- Statistics provides more than simple averages.
- Learn how to apply statistical tools to analyze data, draw conclusions, and make predictions of the future.
- The course will begin with data distributions, followed by probability analysis, sampling, hypothesis testing, inferential statistics, and, finally, regression.
- This course is mathematically intensive, and much of what you learn here will deal with things you encounter every day.

- Statistical techniques have profound applications in almost all areas of modern science, including social and natural sciences.

### Learning Outcomes:

After completion of the course students are expected to be able to:

- Explain the importance of statistics to business;
- Explain the differences between quantitative and qualitative data, and identify examples of each type of data;
- Define and apply the following terms: data sets, mean, median, mode, standard deviation, and variance;
- Summarize and interpret data in a tabular format using frequency distributions and visually with histograms;
- Define and apply the concept of a probability distribution, and explain the properties of different distributions;
- Differentiate between discrete and continuous probability distributions;
- Define and apply the concept of a random variable, and differentiate the population from a sample;
- Relate the central limit theorem to sample size and normal distribution;
- Describe and identify the different sampling methods, including systematic, stratified random, cluster, convenience, panel, and quota sampling, and identify examples of each;
- Use a point estimator from a sample to estimate the entire population;
- Estimate intervals over which the population parameter could exist using sample data;
- Apply hypothesis testing for testing population parameters using one or two samples;
- Identify the dependent and independent variables in the linear regression model; ➤Plot a regression line, and explain how the regression coefficient shapes that line; and ➤Work with statistical data in a spreadsheet environment.

### Course Content:

#### 1.Introduction

(3 Hrs)

Random experiment, outcome, trial and event, Exhaustive events, favourable events, Independent events, sample space, definition of probability, addition theorem of probability, conditional probability, independent events, Mutually and pair wise independent events, multiplication theorem of probability.

#### 2.Random Variable

(5 Hrs)

Random Variable, Distribution function, discrete random variable, Probability mass function, Distribution function of discrete random variable, Continuous random variable, Probability density function. Distribution functions of continuous random variable. Two dimensional probability mass function, Marginal probability function, conditional probability function, Two dimensional distribution function, marginal distribution function, Joint density function, marginal density function.

#### 3.Mathematical Expectations

(3 Hrs)

Definition, Expected value of random variable, expected value of function of a random variable, properties of expectations, Various measures of Central Tendency, Dispersion, skewness and Kurtosis for continuous probability distribution, continuous distribution function, Variance, Properties of variance, covariance.	
<b>4.Moment Generating Function</b>	<b>(3 Hrs)</b>
Definition, Properties of moment generating function, cumulants. Explain the meaning and application of averages, define the meaning and calculation of positional averages, and discuss merits, demerits and limitations of averages.	
<b>5.Measures of Dispersion</b>	<b>(3 Hrs)</b>
Explain the meaning of dispersion, describe the measures of dispersion, and classify the measures of shape of data	
<b>6.Moments</b>	<b>(3 Hrs)</b>
Raw and central moments. Relation between moments: raw moments & central moments, Effect of change of origin and scale on moments, Pearsonian coefficients Measures of skewness, kurtosis.	
<b>7.Standard Distribution</b>	<b>(3 Hrs)</b>
Binomial, Poisson, Negative Binomial Distribution, Normal Distribution and their properties.	
<b>8.Correlation &amp; Regression</b>	<b>(3 Hrs)</b>
Explain the meaning of correlation and regression, measure the coefficients of correlation and regression, and define and measure coefficient of determination.	
<b>9.Index Numbers</b>	<b>(3 Hrs)</b>
Learn about the need of index numbers, explain the different methods of constructing index numbers, evaluate the tests for judging the soundness of an index number.	
<b>10.Time Series</b>	<b>(3 Hrs)</b>
Explain about time series, describe components of time series, and define measurement of variations of time series.	
<b>11.Sampling Theory</b>	<b>(5 Hrs)</b>
Sampling Theory, Random Samples and random Numbers, Sampling with and without replacement, sampling distributions, sampling distribution of means, sampling distribution of properties, sampling distribution of differences and sum, standard errors, software demonstration of elementary sampling Theory.	
<b>12.Hypothesis Testing</b>	<b>(3 Hrs)</b>
Explain meaning of hypothesis, interpret statistical procedure of hypothesis testing, use application of hypothesis testing in several business contexts.	
<b>13.Tests Of Significance</b>	<b>(5 Hrs)</b>
Based On t, F and Z Distributions:-Student's (t) distribution, definition, properties, critical value of t, Application of t-distribution, Test for single mean, t-test for difference of mean, Fischer Z- transformation, F-statistic, critical value of F distribution, application.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Practical of subject is done based on the theory of lecture.	
<b>Reference Books:</b>	
Sheldon M. Ross, <b>Introduction to Probability and Statistics for Engineers and Scientists</b> , 3rd Edition, India: Academic Press, 2005.	
Richard A. Johnson, <b>Miller and Freund's probability and Statistics for Engineers</b> , 6th Edition, Indian reprint: Pearson Education, 2001.	
Ronald E. Walpole, R.H. Myers, S.L. Myers, and K. Ye, <b>Probability and Statistics for Engineers and Scientists</b> , 7th Edition, Indian reprint: Pearson Education, 2005.	

## EUCSC-206: Network Operating System

<b>Course Title</b>	Network Operating System	<b>Course Code</b>	<b>EUCSC-206</b>
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Fourth
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

The main objectives of the course are to:

- To provide basic of networks and distributed systems
- To provide knowledge about protocol architectures
- Statistical techniques have profound applications in almost all areas of modern science, including social and natural sciences.

### Learning Outcomes:

After completion of the course students are expected to be able to:

- Able to use network operating systems
- Being able to make DNS and Installing different software in linux

### Course Content:

#### 1.Introduction

(6 Hrs)

Operating Systems, Services, Protection, Processes, Program vs. Process, Representation, Management, Process

Coordination, Communication, Synchronization (Semaphores, Message Passing), Scheduling, Memory Management (Fixed Assignment, Dynamic Assignment, Virtual Memory

#### 2.Overview to Network Operating Systems(8 Hrs)

Active Directory Service , Boot Process and Boot Sequence, Desktop Environment, Remote Assistance ,Terminal Services, Internet Applications, Physical and Logical Drives, RAID (Redundant Array of Independent Disks), Users and Groups Accounts , Share and Map Resources , NTFS Permissions , Disk Quotas, Network Access to File Resources, System Monitoring, Performance Monitoring ,Web, FTP and Print Servers , Backup and Disaster Recovery.

#### 3.Networks and Distributed Systems

(7 hrs)

Introduction, Benefits, Applications, Network Components, Types of Networks, Communication Basics, Protocols,

Communication Software, Communication Hardware / Media, Synchronous vs. Asynchronous, RS-232 Interface,

#### 4.Network and Protocol Architectures(8 Hrs)

IEEE 802 LAN Standards, LAN Configurations, Ethernet, Token Ring, TCP/IP, OSI, ISDN, ATM), Transmission and

Switching (Circuit Switching, Packet Switching, Client-Server Computing (Language Support, Socket Interface, RPC,

Web Enabled Applications, Network Security)	
<b>5.Redhat linux basic</b>	<b>(9 hrs)</b>
Working with Desktop. Using Terminal Emulator. File System Hierarchy. Configuring Desktop: working With Desktop Control Center. Understanding Run Levels. Managing Users. RedHat User Manager. Creating Groups. Server Role: Linux as Web Server. Apache Web Server. Installing Apache. Starting Apache. Configuring Web server. Setting up First Web Page. FTP Server: Meaning, FTP Protocol. Installing vsftpd FTP Server. Starting FTP server. Testing FTP server. Using FTP server. Using FTP Client to Test Anonymous Read Access.	
<b>6.Connecting to Internet</b>	<b>(7 Hrs)</b>
Network Configuration Tool. Connecting to LAN. DNS, Installing Software (RPM. Meaning, RPM Management Tool. Adding & Removing Packages. Querying RPM Packages), Shell: Different types of Shells. Common Shell Commands. File System Commands. Environmental Variables. File System (What is File System. Anatomy of File System. File Permissions and Directories permissions. File Search Utilities. User Accounts: Super User Vs. Normal User.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b> Practical of subject is done based on the theory of lecture.	
<b>Reference Books:</b> Computer Networks, 3rd Edition. Andrew Tanenbaum, Prentice-Hall, 1995. (continuation of text from CS 337) wEssential System Administration, 2nd Edition Aeleen Frisch, O'Reilly & Associates, 1995. wTCP/IP Network Administration, 2nd Edition Craig Hunt, O'Reilly & Associates, 1998.	

### EUCSC-207: Network and System Administration

Course Title	Network and System Administration	Course Code	EUCSC-207
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			
The main objectives of the course are to: <ul style="list-style-type: none"> <li>To provide basic of network and system administration</li> <li>To provide knowledge about disaster recovery and data integrity</li> </ul>			

<b>Learning Outcomes:</b> After completion of the course students are expected to be able to: <ul style="list-style-type: none"> <li>➤ Able to apply different Network architecture</li> <li>➤ Increases the hands on lab skills on linux server</li> </ul>	
<b>Course Content:</b>	
<b>Unit -1, Foundation of Network and System Administration</b>	<b>(6 Hrs)</b>
Workstation Basics (Loading the os, updating the system software and Application, network configuration, Avoid using Dynamic DNS with DHCP. Server, Services (Customer Requirement, Operational Requirement, Open Architecture, Simplicity, Machine Independence, Environment, Restricted Access, Reliability, Single or Multiple Servers). Data Centers (Location, Access, Security, Power and Cooling, Fire Suppression, Racks, Wiring, Labeling, Communication, Console Access, Workbench)	
<b>Unit – 2 Networks</b>	<b>(4 Hrs)</b>
OSI model, Clean Architecture, Network Topologies, Intermediate Distribution Frame, Main Distribution Frame, Demarcation Points, Documentation, Simple Host Routing, Network Devices, Overlay Networks, Number of Vendors, Standards- Based Protocol.	
<b>Unit – 3 The Disaster Recovery and Data Integrity</b>	<b>(4 hrs)</b>
Client Operating Systems – What is GUI – Database Access – Client Software Products : GUI Environments – Converting 3270/5250 Screens – Database Tools – Client Requirements : GUI Design Standards – Open GUI Standards – Interface Independence – Testing Interfaces .	
<b>Unit – 4 Change Processes</b>	<b>(4 Hrs)</b>
Debugging, Change Management (Risk Mangement, Communication Structure, Scheduling, Process and Documentation, Technical Aspect) ,Server Upgrades	
<b>Unit – 5 Service Conversions and Maintenance Windows</b>	<b>(6 hrs)</b>
Minimize Intrusiveness, layers versus pillars, communication, training, small groups first. Maintenance windows (Scheduling, planning, Directing Managing Change Proposals, Developing the master plan). Centralization and Decentralization	
<b>Unit – 6 Providing Services</b>	<b>(7 hrs)</b>
Service Monitoring (Historical Monitoring, Real-Time Monitoring) . Email Service (Privacy policy, Namespaces, Reliability, Simplicity, Spam and Virus Blocking,), Print Service (Level Centralization, Print Architecture Policy, System Design, Documentation). Data Storage	
<b>Unit - 7 Backup and Restore</b>	<b>(7 hrs)</b>
Reasons for Restore, Types of Restores, corporate Guidelines, A Data- Recovery SLA and Policy, The Backup Schedule, Time and Capacity Planning, consumables Planning, Restore Process Issues, and Backup Automation.	
<b>Unit – 8 Remote Access and Web Services</b>	<b>(7 hrs)</b>
Requirements for remote access, Policy for remote Access, Definition of Service Levels, Centralization, Outsourcing. Web Service Building Blocks, The Webmaster Role, Service level Agreements, Web service Architectures, Scaling for web services, Web service Security, content management, Building the Manageable Generic Web Server.	
<b>Laboratory Work:</b> Practical of subject is done based on the theory of lecture.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Reference Books:</b> Principles of Network and System Administration Second Edition Mark Burgess Oslo University College,	

Norway

**EUCSC-208: Client Server Computing**

<b>Course Title</b>	<b>Client Server Computing</b>	<b>Course Code</b>	<b>EUCSC-208</b>
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- To provide basic of client server architecture
- To provide knowledge about use of server in computing

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- Able to use the client server architecture
- Able to use different server technologies

**Course Content:****Unit- 1 Introduction to Client/Server Computing(8 Hrs)**

What is Client/Server Computing – Benefits of Client/Server Computing – Evolution of C/S Computing – Hardware Trends – Software Trends-Evolution of Operating Systems – N/w Trends – Business Considerations?

**Unit – 2 Overview of C/S Applications****(9 Hrs)**

Components of C/S Applications – Classes of C/S Applications – Categories of C/S Applications. Understanding C/S Computing: Dispelling the Myths – Obstacles – Upfront & Hidden – Open Systems & Standards – Standards – Setting Organizations – Factors of Success.

**Unit – 3 The Client Hardware & Software(9 Hrs)**

Client Operating Systems – What is GUI – Database Access – Client Software Products : GUI Environments – Converting 3270/5250 Screens – Database Tools – Client Requirements : GUI Design Standards – Open GUI Standards – Interface Independence – Testing Interfaces .

**Unit – 4 The Server : Categories of Servers(9 Hrs)**

Features of Server Machines – Classes of Server Machines – Server Environment : N/W Management Environment – N/W Computing Environment – Extensions – Network Operating System – Loadable Module.

**Unit-5 Server Operating System(10 hrs)**

OS/2 2.0 – Windows New Technology – Unix Based OS – Server Requirements : Platform Independence – Transaction Processing – Connectivity – Intelligent Database – Stored Procedure – Triggers – Load Leveling –



Optimizer – Testing and Diagnostic Tools – Backup & Recovery Mechanisms
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>
<b>Laboratory Work:</b> Practical of subject is done based on the theory of lecture.
<b>Reference Books:</b> The Complete Guide to Client/Server Computing Hardcover – June 1, 2000 Principles of Network and System Administration Second Edition Mark Burgess Oslo University College, Norway

### EUCSC-209: Wireless and Mobile Communication

Course Title	Wireless and Mobile Communication	Course Code	EUCSC-209
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Mobile Communication	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

- To provide basic of Random Variables and Mathematical Expression
- To provide knowledge about Correlation and Regression

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- Able to use different wireless network
- Able to use common cellular network

#### Course Content:

<b>Unit- 1 Introduction to wireless telecommunication systems and Networks</b>	<b>(4 Hrs)</b>
History and Evolution Different generations of wireless cellular networks 1G, 2g,3G and 4G networks.	
<b>Unit- 2 Common Cellular System components</b>	<b>(5 Hrs)</b>
Common cellular network components, Hardware and software, views of cellular networks, 3G cellular systems components, Cellular component identification Call establishment.	
<b>Unit – 3 Wireless network architecture and operation</b>	<b>(5 Hrs)</b>
Cellular concept Cell fundamentals, Capacity expansion techniques, Cellular backbone networks, Mobility management, Radio resources and power management Wireless network security.	
<b>Unit-4 GSM Architecture</b>	<b>(10 Hrs)</b>
GSM system overview, GSM Network and system Architecture, GSM channel concepts, GSM identifiers, GSM Interface and Protocol Stack (Introduction, GSM PLMN Interfaces, GSM Radio Interface, GSM Abis Interface, GSM A Interface, GSM Interface for connecting other components, mapping of GSM Layers onto OSI Layers, Protocols Used Across other Interfaces of GSM), GSM and TDMA Techniques, GSM Channels, GSM Identifiers. Traffic cases, Cal handoff, Roaming, GSM protocol architecture, TDMA, Speech coding methods, speech codec attributes, LPAS,	

ITU-T Standards. . CDMA technology, CDMA overview, CDMA channels concept CDMA operations	
<b>Unit- 5 Wireless Modulation Techniques</b>	<b>(7 Hrs)</b>
Introduction, Concept of Modulation, wireless Modulation Techniques, Air Interface, Path Loss Models, Multiple Access Techniques. Orthogonal frequency division multiplexing, ultra wide band radio techniques, Diversity Techniques, GSM Hardware.	
<b>Unit- 6 Wireless Local Area Networks</b>	<b>(7 Hrs)</b>
Introduction, Evolution of Wireless LANs, Wireless LAN Topologies, Wireless LAN Requirements, IEEE 802.11 standards, IEEE802.15 standards, IEEE802.16 Standards, Wireless LAN Applications	
<b>Unit – 7 WiFi and Wimax Technology</b>	<b>( 7 Hrs)</b>
Introduction, Wi-Fi (802.11) - Wi-Fi Features, Wi-Fi Architecture, Wi-Fi modes, WiMAX(802.16)- WiMAX Architecture, WiFi and WiMAX Comparison.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Practical of subject is done based on the theory of lecture.	
<b>Reference Books:</b>	
<ol style="list-style-type: none"><li>1. <b>“Wireless Communications: Principles and Practice” 2<sup>nd</sup> edition by Theodore Rappaport</b></li><li>2. The Complete Guide to Client/Server Computing Hardcover – June 1, 2000</li><li>3. Principles of Network and System Administration Second Edition Mark Burgess Oslo University College, Norway</li></ol>	

# Fifth Semester

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-301	Network Security	6
2	EUCSC-302	Network Programming	6
3	EUCSC-303	Research Methodology	6
4	EUCSC-304	Fundamentals of Project Management	6
5	EUCSC-305	Network Management	6
		Total	30

## EUCSC-301: Network Security

Course Title	Network Security	Course Code	EUCSC-301
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Internet	Semester	Fall, Spring
Level of Course	Introductory	Year of Study	Second Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

The main objectives of the course are to:

The objective of this course is to provide students with a combination of knowledge, hands-on experience, and application of theory to information technology. It helps to understand the confidentiality and integrity of information assets. It also provides knowledge and practices adopted to prevent and monitor unauthorised access, misuse, modification, or denial of a computer network and network accessible resources.

<b>Learning Outcomes:</b>	
After completion of the course students are expected to be able to:	
After the completion of the course, the students will gain knowledge about Network security, network accessible resources and practices.	
<b>Course Content:</b>	
<b>Unit- 1 Review of Internet Architecture and Protocols[3 Hrs]</b>	
Internet Protocol, Addressing, IP over LAN, Routing; End to End Protocols; Naming	
<b>Unit- 2 Non-Cryptographics Network Security[3 Hrs]</b>	
Threats to Communication Networks; Recon and Info Gathering; Intrusive Scans and Probes; Network Architecture Attacks; R2L, U2R Attacks; Web based Attacks; R2L, U2R and Web App Vulnerabilities; Password cracking; Denial of Service; Defenses	
<b>Unit- 3 Cryptography Concepts, algorithms and Security Services[12 Hrs]</b>	
Introduction to Cryptography; Secret Key Cryptography; Modes of Operation of Encryption Algorithms; Hashes and	
Messages Authentication Codes; Public Key Algorithms	
<b>Unit- 4 Authentication Protocols</b>	<b>[3 Hrs]</b>
Overview of Authentication Systems; Authentication of People; Security Handshake Pitfalls; Strong Password Protocols	
<b>Unit-5 Keberos[4 Hrs]</b>	
Introduction to Keberos; Tickets and Tickets Granting Tickets; Network; Realms ; Encryption; Message Formats;	
Cryptographic Algorithms	
<b>Unit- 6 Secur Socket Layers SSL/TLS</b>	<b>[4 Hrs]</b>
Issues with Real-time Communication; Securing Networks; SSL vs IPsec; SSL; TLS	
<b>Unit-7 Public Key Infrastructures (PKI)</b>	<b>[4 Hrs]</b>
Key Distribution; KDC Realms; Certification Authority; Internet Chain Building; X.509 and Certificate Standards	
<b>Unit-8 IPsec: AH, ESP, IKE</b>	<b>[4 Hrs]</b>
IPsec Protocol Suite; AH Formatting; ESP Formatting; Internet Key Exchange;	
<b>Unit-9 Multicast Security[4 Hrs]</b>	
Introduction to Multicast; Multicast on the Internet; Securing Multicast Groups	
<b>Unit- 10 DNS Security</b>	<b>[4 Hrs]</b>
Concepts of DNS; DNS Cache Poisoning; Birthday Paradox Technique; Subdomain DNS; Client Side DNS; DNSSEC	
<b>Unit- 11 Email Security[4 Hrs]</b>	
How Email Works; Security Services; End to End Confidentiality; Additional Security Services	
<b>Unit – 12 Viriuses, Worms</b>	<b>[4 Hrs]</b>
Introduction to Viriuses , Worms; Malware; Securing and Preventive Techniques; Advance Securing Techniques	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Students must do lab works to cover the following topics:	

Buffer Overflow; Port Scanning; Network Intrusion Detection; Host-based Intrusion Detection; Password Cracking;

Firewall; Host Hardening; Man-in-the-Middle Attacks; Vulnerability Scanning

#### Reference Books:

- Cryptography and Network Security Principles and Practices, Seventh Edition By William Stallings
- Network Security: Private Communication in a Public World Charles Kaufman, Radia Perlman, Mike Speciner, Pearson Education
- Mastering AWS Security: Create and maintain a secure Cloud ecosystem, By Albert Anthony
- Guide to Computer Forensics and Investigations, 5<sup>th</sup> Edition, By Bill Nelson, Amelia Phillips, Christopher Stuart

### EUCSC-302: Network Programming

Course Title	Network Programming	Course Code	EUCSC-302
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Internet	Semester	Fifth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge of network programming. To understand the key protocols which support Internet. To be familiar with several common programming interfaces for network communication. To make use of various solutions to perform inter-process communication.

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about different Network Programming as well as will be able to make a program

#### Course Content:

##### Unit- 1 Basic UNIX programming[3 Hrs]

Unix Processes; Unix Signals and Signal Handling; Systems calls; File descriptors and inheritance

##### Unit – 2 Elementary Socket Programming [3 Hrs]

Introduction to sockets; Berkeley Sockets; Sockets address, system call, Error handling; Concept of Reversed Ports ; Elementary TCP and UDP socket programming; Interface Operations using 'ioctl'

##### Unit – 3 I/O Operations [9 Hrs]

Synchronous vs Asynchronous I/O; I/O Multiplexing; Sockets and signals; Signal driven I/O; Nonblocked I/O; Broadcasting and Multicasting; Sending and receiving Out of Band data; Advance I/O functions

##### Unit- 4 Winsock Programming [10 Hrs]

Introduction to Win32 Programming; Difference between UNIX and MSWindows sockets; MSWindow Socket API; Implementing server functionality using multithreading; Synchronization using event objects; Using 'EventSelect' and AsyncSelect' calls; Creating Win32 services	
<b>Unit- 5 Miscellaneous</b>	<b>[4 Hrs]</b>
Daemon processes & Inetd Super Server; Unix Domain Sockets; Passing file descriptors using UNIX domain sockets	
<b>Unit- 6 Programming applications</b>	<b>[4 Hrs]</b>
Time and date routing; Ping; Trivial file transfer protocol	
<b>Unit- 7 Case Study</b>	<b>[8hr ]</b>
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b> Students must do lab works on prolog or LISP to cover the following topics: <ul style="list-style-type: none"> <li>➤ Using Prolog or LISP to understand variables, functions, rules, input-output, arithmetic operations, recursion</li> <li>➤ Solving family relation problems, GCD problem, Tower of Hanoi</li> </ul>	
<b>Reference Books:</b> <ol style="list-style-type: none"> <li>1. Steven W.R., Unix Network Programming, Prentice Hall of India</li> <li>2. Napper Lewis, Winsock 2.0, COMDEX Computer Publishing</li> <li>3. Steven W R, Advanced Programming in UNIX Environment, Addison Wesley</li> <li>4. Microsoft Software Developers Network Documentation</li> <li>5. Davis R., Win32 Network Programming, Addison Wesley</li> <li>6. R. Singhal, "Formal Concepts in Artificial Intelligence", Chapman &amp; Hall</li> </ol>	

### EUCSC-303: Research Methodology

Course Title	Research Methodology	Course Code	EUCSC-303
ECTS Credits	6	Language of Instruction	English
Department	Management	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Mathematics	Semester	Fifth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			
The main objectives of the course are to:  The objective of this course is to provide basic knowledge research Methodology. To state the overall purpose of research. To breakdown the tasks to small, specific taska to achieve the propose of research.To be able to discover answers to questions through the application of scientific procedures			
<b>Learning Outcomes:</b>			
After completion of the course students are expected to be able to: <ul style="list-style-type: none"> <li>➤ After the completion of the course, the students will gain knowledge how to do a research and develop the</li> </ul>			

reports	
<b>Course Content:</b>	
<b>Unit- 1 Foundations of Research</b>	<b>[3 Hrs]</b>
Concept of Theory; Empiricism; Deductive and inductive Theory; Characteristics of scientific method of research	
<b>Unit -2 Problem Identification and Formulation</b>	<b>[3 Hrs]</b>
Research Question; Type of Questions; Hypothesis	
<b>Unit-3 Research Design</b>	<b>[9 Hrs]</b>
Concept and Importance of Research; Exploratory Research Design; Descriptive Research Design; Experimental Research Design	
<b>Unit- 4 Qualitative and Quantitative Research</b>	<b>[10 Hrs]</b>
Qualitative Research; Quantitative Research; Merging the two approaches	
<b>Unit- 5 Measurement</b>	<b>[4 Hrs]</b>
Concept of Measurement; Problems in Measurement; Levels of Measurement	
<b>Unit- 6 Sampling</b>	<b>[4 Hrs]</b>
Concepts and types Sampling; Characteristics of a good sample; Practical consideration in sampling and sample size	
<b>Unit- 7 Data Analysis</b>	<b>[4 Hrs]</b>
Data Preparation; Univariate Analysis; Bivariate Analysis	
<b>Unit- 8 Interpretation of Data and Paper Writing</b>	<b>[4 Hrs]</b>
Layout of Research Papers; Journals in Computer; Publishing; Plagiarism	
<b>Unit – 9 Use of Tools and Encyclopedias</b>	<b>[4 Hrs]</b>
Techniques for Research; Use of Knowledge resources	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Students must do lab works on prolog or LISP to cover the following topics:	
<ul style="list-style-type: none"> <li>➤ Using Prolog or LISP to understand variables, functions, rules, input-output, arithmetic operations, recursion</li> <li>➤ Solving family relation problems, GCD problem, Tower of Hanoi</li> </ul>	
<b>Reference Books:</b>	
<ul style="list-style-type: none"> <li>➤ Business Research Methods – Donald Cooper &amp; Pamela Schindler, TMGH, 9th edition</li> <li>➤ Business Research Methods – Alan Bryman &amp; Emma Bell, Oxford University Press</li> <li>➤ Research Methodology – C.R.Kothari</li> </ul>	

### EUCSC-304: Fundamentals of Project Management

<b>Course Title</b>	Fundamentals of Project Management	<b>Course Code</b>	<b>EUCSC-304</b>
ECTS Credits	6	Language of Instruction	English

Department	Management	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Mathematics	Semester	Fifth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- This course aims to familiarize students with the concept and practice of project planning, execution and controlling of projects and will cover the basic tools, skills, and knowledge necessary to successfully manage a project through its inception, design, planning, and transition phases

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about how to handle the project.

**Course Content:****Unit – 1 Introduction [7 Hrs]**

Concept of Project Management; Project management- nature and scope; Types of project; Project management and project manager; Project management characteristics; Need for project management; Project life cycle; Skills and responsibility of a project manager; Attributes of a good project manager; Essential steps for a successful project initiation; project success and project failure.

**Unit- 2 Project Planning and Formulation [13 Hrs]**

Project environment; Starting the project plan; Process of planning; Human resources-the RACI matrix and agile projects; Project risk management; Estimating project budgets; Improving the process of cost estimating; Risk estimation; Network techniques- PERT and CPM; Resource allocation; The resource allocation problem; Resource loading and leveling; Constraints in resource scheduling; Project formulation techniques; Identification of investment opportunities; Project screening; Feasibility study; Project selection and formulation; Stages in project formulation, ; Project report preparation.

**Unit- 3 Project Organization , Execution and Control [12 Hrs]**

Projects in different Organizations; Selection of a Project; Planning monitoring controlling cycle; Project Management Information System (PMIS); Informed search algorithms (best-first, A\* search); Control in Project

**Unit- 4 Leadership and Teams in Project Management [10 Hrs]**

Managing vs. leading a project; Stakeholders; Influence in Project; Team Management for Project

**Unit- 5 Project Appraisal and Termination [6 Hrs]**

Purpose of Project appraisal; The project audit life cycle; The varieties of Project Termination

**Unit – 6 Project Management in Nepal [10 Hrs]**

Project Management in developing countries; Project development in Nepal; Types of IT projects in Nepal; Benefits and limitations of project management; Practical difficulties in IT Project formulation and implementation



**INTERNAL ASSESSMENT / PRACTICAL SESSIONS****Laboratory Work:**

Students must do lab works on prolog or LISP to cover the following topics:

- Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion
- Solving family relation problems, GCD problem, Tower of Hanoi

**Reference Books:**

- Gilb T, " Principles of Software Engineering Management", Addison Wesley, Reading MA, 1988.
- Khatua, S. Project Management and Appraisal, Oxford
- Thayer R.H., " Software Engineering Project Management", IEEE C.S. Press, 1997. Putnam L.H., Myers W, " Industrial Strength Software - effective Management using measurement", IEEE C.S. Press, 1997..
- Meredith, J. R. and Mantel, S.J., Project Management, John Wiley, NewYork.
- Agrawal, G.R Project Management in Nepal, MR Publication Kathmandu.

**EUCSC-305: Network Management**

<b>Course Title</b>	Network Management	<b>Course Code</b>	<b>EUCSC-305</b>
ECTS Credits	6	Language of Instruction	English
Department	IT	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Internet	Semester	Fifth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge Network Management
- The objective of this course is to provide basic knowledge Network Management. To be able to monitor, manage, and control a network. To understand the concept of fault analysis, performance management, provisioning of networks and maintaining the quality of service.

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about management of Network, be able to monitor, manage, and control a network.

**Course Content:****Unit- 1 Introduction****[3 Hrs]**

OSI Network Management Model; Network Management Layers; Architecture of a Network Management System;  
Network Management Agents

**Unit-2 ISO Network Management Functions****[3 Hrs]**

Configuration and Name Management; Fault Management; Security Management; Accounting Management; Performance Management

<b>Unit- 3 Network Management Protocols</b>	<b>[9 Hrs]</b>
SNMP; Remote Network Monitoring (RMON); Telecommunication Management Network (TMN); Telecommunication Information Management Network Architecture (TINA)	
<b>Unit-4 Network Management Tools</b>	<b>[10 Hrs]</b>
Network Monitors; Network Scanners; Packet Filters	
<b>Unit-5 Wireless Network Management</b>	<b>[4 Hrs]</b>
Cellular Network; Location Management for Cellular Networks	
<b>Unit – 6 Policy-based Network Management</b>	<b>[4 Hrs]</b>
What is a Policy?; Benefits of PBNM; Architecture of a PBNM System	
<b>Unit-7 Network Management using Internet Technology</b>	<b>[4 Hrs]</b>
Introduction; HTTP based Network Management; Smart Management Application; Advance in Network Management	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b> Students must do lab works on prolog or LISP to cover the following topics: ➤ Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion ➤ Solving family relation problems, GCD problem, Tower of Hanoi	
<b>Reference Books:</b>  ➤ A Practical Introduction to Enterprise Network and Security Management By Bongsik Shin ➤ Network Management Fundamentals by Alexander Clemm ➤ Network Management: Principles and Practice by Mani Subramanian ➤ Cable Networks, Services and Management (IEEE Press Series Networks and Service Management) By Mehmet Toy	

# Sixth Semester

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-306	Server Administration	6
2	EUCSC-307	Broadband Networks	6
3	EUCSC-308	Ethical hacking	6
4	EUCSC-309	Project Dissertation -I	6
5		Elective I	6
		Total	30

## EUCSC-306: Server Administration

<b>Course Title</b>	Server Administration	<b>Course Code</b>	<b>EUCSC-306</b>
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge of Server. To make student able to organize, install and support a server system. To provide complete Knowledge of Windows Server, Linux Server

### Learning Outcomes:

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about System Administration, Windows Administration and Linux Administration.

### Course Content:

#### Unit-1 Introduction

[3 Hrs]

System Administrator; History of System Administrator; System Administrator Roles; Basic of Windows/ Unix/Linux

<b>Unit- 2 Account Management</b>	<b>[3 Hrs]</b>
Introduction to account Management; File and Directory layout; File System; File Permissions; ACL; Virtual Machine Management	
<b>Unit-3 Basic Tools</b>	<b>[9 Hrs]</b>
Basic DOS/Windows/Unix commands tools; Command Line vs GUI; Start up and Shutdown; Task Manager; More Account Management	
<b>Unit- 4 System Processes</b>	<b>[10 Hrs]</b>
Scheduling Jobs; Job Monitoring; Start and Stop Jobs; At Command vs Scheduled Tasks GUI tools; More Task Manager	
<b>Unit-5 Disk Administrator</b>	<b>[4 Hrs]</b>
File systems/ Partitions; Disk DeFragmentation; RAID; Basic client/ Server Sharing; Files, Directories and Memory Management; Permissions	
<b>Unit – 6 Networking</b>	<b>[4 Hrs]</b>
TCP/IP; DNS; DHCP; Domains/NIS; File Sharing; Client/ Server; NFS; NetBeui; PDC/BDC; Active Directory; Ethernet Addresses; Hostname	
<b>Unit- 7 Automating System Admin Tasks</b>	<b>[4 Hrs]</b>
Scripts; Regedit; Shell, Perl C	
<b>Unit- 8 Security and Backups</b>	<b>[4 Hrs]</b>
Patches; Passwords; Kerberos; Enigma; Backup Methods	
<b>Unit-9 Advanced Topics</b>	<b>[4 Hrs]</b>
Control Panel and Admin Tools; Computer Management GUI Tools; Update; Samba; Essential Service; Popular Applications	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b> Students must do lab works on prolog or LISP to cover the following topics: ➤ Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion ➤ Solving family relation problems, GCD problem, Tower of Hanoi	
<b>Reference Books:</b> <ul style="list-style-type: none"> <li>➤ Windows Server 2016: The Administrator's Reference by William Stanek</li> <li>➤ SQL Server 2017 Administrator's Guide: One stop solution for DBAs to monitor, manage, and maintain enterprise databases by Marek Chmel and Vladimir Muzny</li> <li>➤ The Accidental Administrator: Linux Server Step-by Configuration Guide by Don R Crawley</li> <li>➤ Apache Server Administrator's Handbook by Mohammed J. Kabir</li> </ul>	

## EUCSC-307: Broadband Networks

<b>Course Title</b>	<b>Broadband Networks</b>	<b>Course Code</b>	<b>EUCSC-307</b>
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3

Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge of Broadband Networks. To understand different Protocols and mechanism of Broadband Networks. To know how the messages get transfer in the Broadband Networks

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about Broadband Network and their communication techniques as well as the process.

#### Course Content:

##### Unit-1 Introduction[3 Hrs]

What is Broadband ?; History of Broadband; Types of Broadband; Broadband Services

##### Unit- 2 Broadband Network Architecture[12 Hrs]

Layered Model; Ethernet as uniform transport Protocol; Access: Connection Mode; Core: MPLS VPN; Core Network;

MPLS ; Increasing Complexity; Quality of Service; Security; IPV6; Cloud and Virtualization; Next Generation Fixed and

3GPP Wireless Access

##### Unit-3 Packet Switch Interconnection [3 Hrs]

Switching Elements; Switch Functionality; Queuing; Traffic –Handling

##### Unit- 4 Metropolitan Area Networks[10 Hrs]

Distributed Queue Dual Bus; Fiber-Distributed-Data Interface (FDDI); Delay and Blocking Performance of FDD

##### Unit-5 Broadband ISDN and Asynchronous Transfer Mode[4 Hrs]

Broadband ISDN and ATM: Preliminaries; B-ISDN Protocol Reference Model; Function of the ATM; ATM LAN

##### Unit- 6 Issues in Traffic Control and Performance Management[4 Hrs]

Introduction; Admission Control; Policing; Flow Control; Self-Learning Strategies

##### Unit- 7 Broadband Applications[4 Hrs]

Network Service Applications; End-User Applications

##### Unit- 8 Wireless and Mobile as a Cyber Physical Infrastructure (CPS)[4 Hrs]

Wifi, PGs; Internet of Things

#### INTERNAL ASSESSMENT / PRACTICAL SESSIONS

##### Laboratory Work:

Students must do lab works on prolog or LISP to cover the following topics:

- Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion
- Solving family relation problems, GCD problem, Tower of Hanoi

#### Reference Books:

- Broadband Matching: Theory and Implementations ( Advanced Series in Electrical and Computer Engineering) By  
Wai-Kai Chen
- Analyzing Broadband Networks By Mark A. Miller
- From GSM to LTE-Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband By  
Martin Sauter
- Broadband Wireless Multimedia Networks By Benny Bing

### EUCSC-308: Ethical Hacking

<b>Course Title</b>	Ethical Hacking	<b>Course Code</b>	<b>EUCSC-308</b>
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge Ethical Hacking
- The objective of this course is to provide basic knowledge Ethical Hacking. To understand real world assessments of security weaknesses, vulnerability, risk, and remediation options. To understand the role of an ethical hacker, role of security and penetration testers.

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about the role of an ethical hacker, role of security and penetration testers

#### Course Content:

##### Unit- 1 Introduction [3 Hrs]

The importance of security; Phases involved in hacking; An overview of attacks and exploit categories; The legal Implications

##### Unit-2 Footprinting [3 Hrs]

Introduction to footprinting; Information gathering methodology; Tools used for the reconnaissance phase; Countermeasures

##### Unit- 3. Scanning [9 Hrs]

Detecting 'live' systems on target network; Discovering service running/listening on target system; Port scanning techniques; Active and passive fingerprinting; Automated discovery tools

<b>Unit- 4. Enumeration</b>	<b>[10 Hrs]</b>
Identifying valid users account; Active connections to Systems and Directed Queries; Null Session; NetBIOS Enumeration; SNMP Enumeration; Applications and Banners	
<b>Unit- 5. System Hacking</b>	<b>[4 Hrs]</b>
Remote password guessing; Eavesdropping; Denial of Service; Buffer Overflows; Privilege Escalation; Password Cracking; Keystroke loggers; Sniffers; Remote Control and Backdoor Genre; Port redirection; Covering tracks; Hiding files	
<b>Unit- 6. Trojans and Backdoors</b>	<b>[4 Hrs]</b>
Defining Trojans and Backdoors; Understanding the various backdoor Genre; Trojan tools; Prevention methods and countermeasures; Anti-Trojan software	
<b>Unit- 7. Sniffers</b>	<b>[4 Hrs]</b>
Active and Passive Sniffing; ARP Spoofing and Redirection; DNS and IP Sniffing and Spoofing	
<b>Unit- 8. Denial of Service</b>	<b>[4 Hrs]</b>
DOS and Distributed DOS Attacks; Types of DOS Attacks; Tools for running DOS attacks; DDOS Attacks; DOS Countermeasures	
<b>9. Social Engineering</b>	<b>[4 Hrs]</b>
Common Types of Attacks; Online Social Engineering; Reverse Social Engineering; Policies and Employee Awareness	
<b>Unit- 10. Session Hijacking</b>	<b>[4 Hrs]</b>
Poofing Vs Hijacking; Types of session Hijacking; TCP/IP concepts; Performing Sequence prediction; ACK storms; Session Hijacking Tools	
<b>Unit- 11. Web Server Hacking</b>	<b>[4 Hrs]</b>
Web Servers and Common Vulnerabilities; Apache Web Server Security; IIS Server Security; Attacks against Web Servers; Countermeasures	
<b>Unit- 12. Web Application Vulnerabilities</b>	<b>[4 Hrs]</b>
Common Web Application Security Vulnerabilities; Penetration Methodologies; Input Manipulation; Authentication and Session Management; Tools and Countermeasures	
<b>Unit- 13. Password Cracking</b>	<b>[4 Hrs]</b>
HTTP Authentication Basic and Digest; NTLM Authentication; Certificate Based Authentication; Form Based Authentication; Password Guessing; Password Cracking Tools	
<b>Unit- 14. SQL injection</b>	<b>[4 Hrs]</b>
Exploiting the weakness of Server Side Scripting; Using SQL Injection techniques to gain a access to a system; SQL Injection Scripts; Prevention and Countermeasures	
<b>Unit- 15. Hacking Wireless Networks</b>	<b>[4 Hrs]</b>
Introduction to 802.11; WEP; Cracking WEP Keys; WLAN Scanners; WLAN Sniffers; Securing Wireless Networks	
<b>Unit- 16. Linux Hacking</b>	<b>[4 Hrs]</b>
Scanning and mapping Networks; Password Cracking in Linux; Sniffing; Session Hijacking; Linux Rootkits; IP Chains and IP Tables; Linux Security Countermeasures	

**Unit- 17. Evading Firewalls, IDS and Honeypots****[4 Hrs]**

Intrusion Detection System; Integrity Verifiers; Intrusions Detection; Anomaly Detection; Signature Recognition;

Protocol Stack Verification; Application Protocol Verification; Hacking Through Firewalls; Honey Pots

**INTERNAL ASSESSMENT / PRACTICAL SESSIONS****Laboratory Work:**

Students must do lab works on prolog or LISP to cover the following topics:

- Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion
- Solving family relation problems, GCD problem, Tower of Hanoi

**Reference Books:**

- Shon Harris, Allen Harper, Criss Eagle, Jonathan Ness , “Gray at Hacking – The Ethical Hacker’s Handbook” , Mc Graw
- HillRyan Russel, Elias Levy, Jeremy Ruch & others, “Hack Proofing Your Network – Internet TradeCraft”, SYNGRESS
- Mike Schiffman, “Hacker’s Challenge; Test your Incident response Skills using twenty scenarios”, Osborne/Mc Graw Hill

**EUCSC-309: Project Dissertation -I**

Course Title	Project Dissertation -I	Course Code	EUCSC-309
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Report/ Research Report	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- The objective of this course is to provide research report about any topics related to computer science, cyber security, internet technology.....etc...

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.

**Course Content:****INTERNAL ASSESSMENT / PRACTICAL SESSIONS**



### Laboratory Work:

Students must do lab works on prolog or LISP to cover the following topics:

- Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion
- Solving family relation problems, GCD problem, Tower of Hanoi

### Reference Books:

- Shon Harris, Allen Harper, Criss Eagle, Jonathan Ness , “Gray at Hacking – The Ethical Hacker’s Handbook” , Mc Graw Hill
- Ryan Russel, Elias Levy, Jeremy Ruch & others, “Hack Proofing Your Network – Internet TradeCraft”, SYNGRESS □ Mike Schiffman, “Hacker’s Challenge: Test your Incident response Skills using twenty scenarios”, Osborne/ Mc. Graw Hill. 98

# Seventh Semester

SN	Course Code	Course Title	ECTS Credits
1	EUCSC-401	Cyber Security and IOT	6
2	EUCSC-402	Artificial Intelligence	6
3	EUCSC-403	IT Acts and Cyber Law	6
4	EUCSC-404	Project Dissertation – II	6
5		Elective II	6
		Industrial Training	
		Total	30

## EUCSC-401: Cyber Security and IOT

Course Title	Cyber Security and IOT	Course Code	EUCSC-401
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Cyber Security	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			

The main objectives of the course are to:	
<ul style="list-style-type: none"> <li>□The objective of this course is to provide basic knowledge Cyber Security. To understand cyberattacks data breaches and identity theft and would be able to aid in risk amangement</li> </ul>	
<b>Learning Outcomes:</b>	
After completion of the course students are expected to be able to:	
<ul style="list-style-type: none"> <li>➤After the completion of the course, the students will gain knowledge about cyberattacks, data breaches abd identity theft and would be able to aid in risk management</li> </ul>	
<b>Course Content:</b>	
<b>Unit-1. Introduction</b>	<b>[3 Hrs]</b>
Definitions and goals in AI; History and challenges of AI; Applications of AI;	
<b>Unit - 2. Data Security</b>	<b>[3 Hrs]</b>
Cryptography; Digital Forensics; Digital Forensic tools & Investigation; Data Integrity and Authentication; Access Control; Secure Communication Protocols; Cryptanalysis; Data Privacy; Information storage Security	
<b>Unit-3 3. Software Security</b>	<b>[9 Hrs]</b>
Fundamental Principals of Software Security; Design Security; Implementation; Analysis and Testing; Deployment and Maintenance; Documentation; Ethics	
<b>Unit - 4. Component Security</b>	<b>[10Hr]</b>
Component Design Security; Component Procurement; Component Testing; Component Reverse Engineering	
<b>Unit - 5. Connection Security</b>	<b>[4 Hrs]</b>
Physical Media; Physical Interfaces and Connectors; Hardware Architecture; Distributed System Architecture; Network Architecture; Network Implementations; Network Services; Network Defense	
<b>Unit- 6. System Security</b>	<b>[4 Hrs]</b>
System Thinking; System Management; System Access and Control; System Retirement; System Testing; Common System Architectures	
<b>Unit- 7. Human Security</b>	<b>[4 Hrs]</b>
Identity Management; Social Engineering; Personal Compliance with Cybersecurity Rules/ Policy/ Ethical Norms; Awareness and Understanding; Socail and Behavioral Privacy	
<b>Unit- 8. Personal Data Privacy and Security</b>	<b>[4 Hrs]</b>
Sensitive Persoanl Data (SPD); Personal tracking and digital footprint; Usable Security and Privacy	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Students must do lab works on prolog or LISP to cover the following topics:	
<ul style="list-style-type: none"> <li>➤ Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion</li> <li>➤ Solving family relation problems, GCD problem, Tower of Hanoi</li> </ul>	
<b>Reference Books:</b>	
<ul style="list-style-type: none"> <li>➤ Cybersecurity for Beginners By Raef Meeuwisse</li> <li>➤ Cybersecurity Attack and Defense Strategies: Infrastructure security with Red Team and Blue Team tactics By Yuri Diogenes and Erdal Ozkaya</li> <li>➤ Effective Cybersecurity: A Guide to Using Best Practices and Standards By William Stallings</li> <li>➤ The Hacker Playbook 3: Practical Guide To Penetration Testing By Peter Kim</li> </ul>	

**EUCSC-402: Artificial Intelligence**

Course Title	Artificial Intelligence	Course Code	EUCSC-402
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Cyber Security	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

The objective of this course is to provide basic knowledge of AI, machine learning, natural language, expert system and neural network.

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about AI, machine learning, natural language and neural network.

**Course Content:****Unit- 1. Introduction [3 Hrs]**

Definitions and goals in AI; History and challenges of AI; Applications of AI;

**Unit- 2. Agents [3 Hrs]**

Introduction to agents and agent programs; Types of agent programs;  
Properties and types of agent environment, PEAS

**Unit- 3. Problem solving[9 Hrs]**

Planning and its types; Problem and its types; Searching and its types; Uniformed search algorithms (breadthfirst, depth-first, depth-limited search, iterative- deepening, uniform-cost, bi-directional search); Informed search algorithms (best-first, A\* search); Means-ends analysis; Forward chaining and backward chaining; Game playing; Constraint satisfaction problem and crypt-arithmetic puzzles

**Unit- 4. Knowledge representation[10 Hrs]**

Knowledge and its types; Logic, semantic nets, frames; Propositional logic; Predicate logic; Clausal form, resolution

**Unit- 5. Reasoning [4 Hrs]**

Inference theorems; Monotonic and non-monotonic reasoning; Probabilistic reasoning, Bayesian network; Casebased reasoning; Uncertainty in reasoning

**Unit- 6. Learning[4 Hrs]**

Concepts and types of learning; Rote learning, learning by analogy, inductive learning; Explanation based learning; Supervised and unsupervised learning; Genetic algorithm

**Unit- 7. Neural network[4 Hrs]**

Introduction to artificial neural network; Network structure; Back propagation; Hopfield network, Boltzmann machines

**Unit- 8. Expert system[4 Hrs]**

Structure of expert system; Knowledge acquisition, knowledge elicitation; Application and development of expert system; Examples of expert systems- DENDRAL, MYCIN, etc

**Unit- 9. Natural language processing [4 Hrs]**

Concepts of natural language understanding and natural language generation; Steps in natural language processing; Parse tree representation in natural language

**INTERNAL ASSESSMENT / PRACTICAL SESSIONS****Laboratory Work:**

Students must do lab works on prolog or LISP to cover the following topics:

- Using Prolog or LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion.
- Solving family relation problems, GCD problem, Tower of Hanoi

**Reference Books:**

- E. Rich & K. Knight, "Artificial Intelligence", McGraw Hill
- E. Turban, "Decision Support Systems & Expert Systems", Macmillan
- P. H. Winston, "Artificial Intelligence", Addison Wesley
- D. Crookes, "Introduction to Programming in Prolog", Prentice Hall
- Stuart Russel & Peter Norvig, "Artificial Intelligence", Pearson Edition
- R. Singhal, "Formal Concepts in Artificial Intelligence", Chapman & Hall

**EUCSC-403: IT Acts and Cyber Law**

<b>Course Title</b>	IT Acts and Cyber Law	<b>Course Code</b>	<b>EUCSC-403</b>
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Law	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge IT Acts and Cyber Law. To understand a legal and regulatory framework to enable a safe and vibrant cyberspace.

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about IT acts and Cyber Laws

**Course Content:****Unit- 1. Introduction to Cybercrime [4 Hrs]**

Definitions of Cybercrime; Cybercriminal behaviour; Cyber terrorism; Cybercriminal investigations; Economics of

Cybercrime
<b>Unit- 2. Cyber Law[9 Hrs]</b> Introduction to Cyber Law; Constitutional foundations of Cyber Law; Intellectual property related to cyber security; Privacy Laws; Data Security Laws; Computer hacking Laws; Digital evidence; Digital contracts; Multinational conventions; Cross-borded privacy and data security laws
<b>Unit- 3. Cyber Ethis[9 Hrs]</b> Defining ethics; Professional ethics and codes of conduct; Ethis and equity/diversity; Ethics and Law; Autonomy/ robot ethics; Ethics and conflict; Ethical hacking; Ethical frameworks and normative theories
<b>Unit- 4. Cyber Policy[10 Hrs]</b> International cyber policy; Nepal cyber policy; Global impact; Cybersecurity policy and national security; National economic implications of cybersecurity; New adjacencies to diplomacy
<b>Unit- 5. Privacy[4 Hrs]</b> Defining privacy; Privacy rights; Safeguarding privacy; Privacy norms and attitudes; Privacy breaches; Privacy in socities
<b>Unit- 6. Security Governance[4 Hrs]</b> Concept of Security Governance; Executive and board level Communication; IT Complainece; Managerial Policy
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>
<b>Laboratory Work:</b> Students must do lab works on prolog or LISP to cover the following topics: <ul style="list-style-type: none"> <li>➤ Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion</li> <li>➤ Solving family relation problems, GCD problem, Tower of Hanoi</li> </ul>
<b>Reference Books:</b> <ul style="list-style-type: none"> <li>➤ E. Rich &amp; K. Knight, "Artificial Intelligence", McGraw Hill</li> <li>➤ E. Turban, "Decision Support Systems &amp; Expert Systems", Macmillan</li> <li>➤ P. H. Winston, "Artificial Intelligence", Addison Wesley</li> <li>➤ D. Crookes, "Introduction to Programming in Prolog", Prentice Hall</li> <li>➤ Stuart Russel &amp; Peter Norvig, "Artificial Intelligence", Pearson Edition</li> <li>➤ R. Singhal, "Formal Concepts in Artificial Intelligence", Chapman &amp; Hall</li> </ul>

#### EUCSC-404: Project Dissertation -II

Course Title	Project Dissertation -II	Course Code	EUCSC-404
ECTS Credits	6	Language of Instruction	English
Department	Computer Science	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Report/ Research Report	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

<b>Objectives of the Course:</b>
The main objectives of the course are to:  □The objective of this course is to provide research report about any topics related to computer science, cyber security, internet technology.....etc...
<b>Learning Outcomes:</b> After completion of the course students are expected to be able to: <ul style="list-style-type: none"><li>➤ This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.</li><li>➤ Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.</li><li>➤ Upon completion, students should be able to customize and use Linux systems for command line requirements and desktop productivity roles.</li></ul>
<b>Course Content:</b>
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>

# Eighth Semester

SN	Course Code	Course Title	ECTS Credits
1.	EUCSC-409	Organization Behavior and HRM	6
2.	EUCSC-410	Industrial Training	12
3.		Elective III	6
4.		Elective IV	6
		Total	30
		Grand Total	240

### EUCSC-409: Organizationa Behaviour and HRM

<b>Course Title</b>	Organization Behavior and HRM	<b>Course Code</b>	<b>EUCSC-409</b>
ECTS Credits	6	Language of Instruction	English
Department	Management	Credit Hour	3
Prerequisites	None	Type of Course	Major
Field	Management	Semester	Eight
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge of HRM and organization. To understand the effectiveness of various HRM and performance management practices, system and policies in organizations. To provide tools and analytical theory of analysis

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- After the completion of the course, the students will gain knowledge about Organization Behaviour and HRM.

#### Course Content:

##### Unit -1. Introduction to HRM[3 Hrs]

The HRM framework; Role of HRM in IT institutions; Global view of HRM

##### 2. Functions of HRM[3 Hrs]

Conducting Job analysis; Selecting job candidates; Orienting and training new employees; Managing Wages and Salaries; Providing Incentives and benefits; Appraising performance and Communicating; Training and developing;

Employee health and safety; Grievances and labour relations

<b>3. The HRM Strategy [9 Hrs]</b>
Planning and budgeting; The demand for human resources; The supply of human resources; Setting the budget
<b>4. The HRM Process [10 Hrs]</b>
Preparation and Selection; Development and Evaluation; Protection; Employee Skill Management; Payroll Management;
<b>5. HRM Challenges [4 Hrs]</b>
Managing workplace diversity; Organizing talent strategically; Motivational Approaches
<b>6. Business Ethics and Organizational code of conduct [4 Hrs]</b>
What are business ethics?; Scope and application; Organizational code of conduct
<b>7. Organization Behaviour Concepts [4 Hrs]</b>
Meaning, purpose and importance of organizational behavior; Vision, mission and values of an organization and how it impacts the culture; Elements of organization behavior; Models of organizational behavior; Leadership and decision making; Managing conflicts at work place; Managing difficult people in the work place
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>
<b>Laboratory Work:</b>
Students must do lab works on prolog or LISP to cover the following topics:
➤ Using Prolog/LISP to understand variables, functions, rules, input-output, arithmetic operation, recursion
➤ Solving family relation problems, GCD problem, Tower of Hanoi
<b>Reference Books:</b>

### List of Elective Subjects

SN	Subject Code	Subject	Group
1.	EUCSC-310	Distributed Networking	Elective -I
2.	EUCSC-311	E-Governance	
3.	EUCSC-312	Data center Design and Management	
4.	EUCSC-313	Linux for Systems Administrators	
5.	EUCSC-405	Cryptography	Elective - II
6.	EUCSC-406	E-Commerce	
7.	EUCSC-407	Net Centric Design	
8.	EUCSC-408	Security Audit	
9.	EUCSC-411	GIS	Elective -III
10.	EUCSC-412	Advance Java Programming	



11.	EUCSC-413	Information Security	Elective-IV
12.	EUCSC-414	Cyber forensic	
13.	EUCSC-415	Advanced Networking with IPv6	
14.	EUCSC-416	Cloud Computing	
15.	EUCSC-417	Introduction to Programming with Python	
15.	EUCSC-418	Criminal Evidence and Procedures	

### EUCSC-310: Distributed Networking

<b>Course Title</b>	Distributed Networking	<b>Course Code</b>	<b>EUCSC-310</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

The objective of this course is to provide basic knowledge of HRM and organization

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

#### Course Content:

##### Unit 1: 8Hrs

Protocols-functions, design, implementation and testing, Architectures, Standards and Protocols-TCP OSI/IP, connectionless and connection-oriented protocols, protocol stacks, Internetworking-bridges and routers, Internet design and evolution.

##### Unit 2: 8Hrs

Network Design, Performance, Operation and Management-architecture, interoperability and open systems issues, Introduction to Distributed Systems-client/server model, workstations.

##### Unit 3: 8Hrs

Inter-process Communication: API for Internet protocols, External data representation and Marshalling, Client server architecture, Peer-to-peer architecture, Client-Server communication and Group communication

#### Unit 4: 8Hrs

Distributed Objects and Remote Invocation: Communication between distributed objects, Remote Procedure Call,

Remote Object Invocation, Message- and Stream-oriented communication, Distributed Web-Based Systems, Common

Carrier Services

#### Unit 5: 8hrs

Distributed OS: network operating systems, Distributed File systems, Distributed synchronization, Distributed objectbased systems, Fault Tolerant Computing Systems.

#### Unit 6: 5hrs

Advance Application: Grid Computing and Application, virtualization and cloud computing

#### INTERNAL ASSESSMENT / PRACTICAL SESSIONS

##### Laboratory Work:

Students must do lab works on prolog or LISP to cover the following topics:

- Using prolog / LISP to understand variables, fucntions, rule input-output, arithmetic operation, recursion.
- Solving family relation problems, GCD problem, Tower of Hanoi

##### Reference Books:

1. Comer DE, (1995), Internet working with TCP/IP Vol. 1, 3e, Prentice-Hall.
2. Distributed Systems: Principles and Paradigms - Andrew Tanenbaum and Maarten van Steen, Prentice Hall, 2007

#### EUCSC-311: E-Governance

Course Title	E-Governance	Course Code	EUCSC-311
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

##### Objectives of the Course:

The main objectives of the course are to:

The objective of this course is to provide basic knowledge of HRM and organization

##### Learning Outcomes:

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

##### Course Content:

##### Unit 1. Introduction 4 Hrs.

E-Governance: Needs of E-Governance, Issues in E-Governance applications and the Digital Divide; Evolution of EGovernance, Its scope and content; Present global trends of growth in E-Governance: Other issues.

### Unit 2. Models of E-Governance 10 Hrs.

Introduction; Model of Digital Governance: Broadcasting/ Wilder Dissemination Model, Critical Flow Model, Comparative Analysis Model, Mobilization and Lobbying Model, Interactive-service Model/Government-to-Citizen-to-Government Model (G2C2G); Evolution in E-Governance and Maturity Models: Five Maturity Levels, Characteristics of Maturity Levels, Key areas, Towards Good Governance through E-Governance Models.

### Unit 3. E-Governance Infrastructure and Strategies 6 Hrs.

E-readiness: Digital System Infrastructure, Legal Infrastructural Preparedness, Institutional Infrastructural Preparedness,

Human Infrastructural Preparedness, Technological Infrastructural Preparedness; Evolutionary Stages in E-Governance.

### Unit 4. Data Warehousing and Data Mining in Government 5 Hrs.

Introduction; National Data Warehouses: Census Data, Prices of Essential Commodities; Other areas for Data Warehousing and Data Mining: Agriculture, Rural Development, Health, Planning, Education, Commerce and Trade, Other Sectors.

### Unit 5. Case Studies 10 Hrs.

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National

Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchayat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

### INTERNAL ASSESSMENT / PRACTICAL SESSIONS

#### Laboratory Work:

Students must do lab works on prolog or LISP to cover the following topics:

- Using prolog / LISP to understand variables, functions, rule input-output, arithmetic operation, recursion.
- Solving family relation problems, GCD problem, Tower of Hanoi

#### Text / Reference books:

1. E-Governance: Concepts and Case Studies, C.S.R. Prabhu, Prentice-Hall of India Private Limited, 2004.
2. Backus, Michiel, e-Governance in Developing Countries, IICD Research Brief, No. 1, March 2001.

## EUCSC-312: Data Center Design and Management

Course Title	Data Centre Design & Management	Course Code	EUCSC-312
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			

The main objectives of the course are to:

The objective of this course is to provide basic knowledge of Data Center Design and Management

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

**Course Content:**

**Unit 1: Introduction 2 hrs**

Introduction to data center, Features, Consideration while establishing data center, High-Availability Metrics, Data Center

Facilities

**Unit 2: Data Center Architecture 8 hrs**

Data Center Requirements, Required Physical Area for Equipment and Unoccupied Space , Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight , Required Network Bandwidth , Budget Constraints , Selecting a Geographic, Location Safe from Natural Hazards , Safe from Man-Made Disasters , Availability of Local

Technical Talent , Abundant and Inexpensive Utilities Such as Power and Water

**Unit-3 Data Center Design 8 hrs**

Characteristics of an Outstanding Design, Guidelines for Planning a Data Center, Data Center Structures, No-Raised or

Raised Floor , Aisles , Ramp , Compulsory Local Building Codes , Raised Floor Design and Deployment , Plenum , Floor

Tiles , Equipment Weight and Tile Strength , Electrical Wireways , Cable Trays , Design and Plan against Vandalism

**Unit 4 Network Infrastructure in a Data Center 3 hrs**

Modular Cabling Design , Points of Distribution (PODs) , Internet Access , ISP Network Infrastructure

**Unit 5 Data Center Maintenance 8 hrs**

Network Operations Center (NOC) , Network Monitoring , Monitoring Requirements , SNMP , In-Band and Out-of-Band

Monitoring , Data-Center Physical Security , Data-Center Logical Security , Data-Center Cleaning , Approved Cleaning

Supplies , Floor Surface Cleaning , Subfloor and Above-Ceiling Plenum Cleaning , Equipment Cleaning

**Unit 6 Power Distribution in a Data Center 3 hrs**

Estimating Your Power Needs , Uninterruptible Power Supply (UPS) , Generators , Power Conditioning , Power Distribution

Units (PDUs) , Electrostatic Discharge (ESD)

**Unit 7 Data Center HVAC 3 hrs**

Reasons for Strict Environmental Requirements , Need for Energy-Efficient HVAC Systems , Air-Conditioning Systems

, Air Circulation in a Data Center , Placement of Hardware Racks

**Unit 8 Data Center consolidation 4 hrs**

Data center Consolidation, Reasons for data center Consolidation, Consolidation opportunity, Server

consolidation, Storage Consolidation, Network Consolidation, Service Consolidation, Process Consolidation, Staff Consolidation, Data

Consolidation phases

#### **Unit 9 Data center servers, Server Capacity Planning, Server Security, Device Naming and Load Balancing 6hrs**

System Management Best Practices, Server Cluster Best Practices, Data Storage Best Practices, Network Management Best Practices, Documentation Best Practices , Security Guidelines Internet security, Source Security Issues , Device Naming, Naming Practices, NIS, DNS, LDAP, Load balancing, Terminology, Advantages, Types of load balancing,

Implementing a Network with Load-Balancing Switches

#### **Unit 10. Case Studies 10 Hrs.**

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India:

NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

#### **INTERNAL ASSESSMENT / PRACTICAL SESSIONS**

##### **Laboratory Work:**

Students must do lab works on prolog or LISP to cover the following topics:

- Using prolog / LISP to understand variables, functions, rule input-output, arithmetic operation, recursion.
- Solving family relation problems, GCD problem, Tower of Hanoi

##### **Reference Books:**

Administering Data Centers: Servers, Storage and Voice over IP, Kailash Jayaswal ; Data center fundamentals, Mauricio

Arregoces, Maurizio Portol

### **EUCSC-313: Linux for Systems Administrators**

Course Title	Linux for Systems Administrators	Course Code	EUCSC-313
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Computer System	Semester	Sixth
Level of Course	Introductory	Year of Study	Third Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### **Objectives of the Course:**

The main objectives of the course are to:

- The objective of this course is to provide basic knowledge of Linux for Systems Administrators

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

**Course Content:****Unit 1: Introduction (5hrs)**

History and system structure , user perspective and operating system services , Kernel architecture of Unix , Unix system concepts , Kernel data structure and system administration

**Unit 2: Managing files from command line (8hrs)**

Linux file hierarchy, Locating files and directories by Name, Linux file system default permissions and access, Managing Linux file system permission, controlling new file permission and ownership.

**Unit 3: Monitoring and managing Linux process and logs (8hrs)**

Linux Process, Controlling jobs, Background process and foreground process, Monitoring Process Activity, Killing processes, reviewing syslog files.

**Unit 4: Managing Linux Users (8hrs)**

User creating and Management commands, /etc/passwd, /etc/shadow and /etc/group, Users and access permissions, Modifying user and group attributes.

**Unit 5: Booting, File systems and Core System services (8hrs)**

Boot loaders and init process, Enabling and Disabling Services, booting and shutting down, Managing file systems,  
Adding new disk, Syslog Daemon and CRON

**Unit 6: Servers and Internet Services (8hrs)**

DNS: Understanding DNS and configuring DNS, configuring DNS Client, Virtualization, Setting up web server: Understanding and Installing HTTP, Configuring Apache

**Unit 10. Case Studies 20 Hrs.**

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andhra Pradesh, Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchayat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

**INTERNAL ASSESSMENT / PRACTICAL SESSIONS****Laboratory Work:**

Students must do lab works on Prolog or LISP to cover the following topics:

- Using Prolog/LISP to understand variables, functions, rule, input-output, arithmetic operation recursion.
- Solving family relation problems, GCD problem, Tower of Hanoi

**Reference:**

Steve Shah and Wale Soyinka "Linux Administration: A Beginner's Guide", 4th Edition, Tata McGraw-Hill Publishing  
Company Limited, New Delhi, ISBN: 978-0072262599

<b>Course Title</b>	<b>Cryptography</b>	<b>Course Code</b>	<b>EUCSC-405</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Computer System	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

1. To provide basic of Cryptography and Encryption
2. To provide knowledge about use of cryptography in Network security

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

**Course Content:****Unit-1 Introduction****(4 Hrs)**

Overview - Classical Crypto Systems – Substitution Ciphers –Transposition Ciphers - Stream and Block Ciphers – Introduction to Number Theory – Congruences – Chinese Remainder theorem – Modular Arithmetic - Modular Exponentiation – Fermats and Eulers Theorem - Finite Fields – GF(2n) Fields.

**Unit 2: Basics of Modern Cryptography****(5 Hrs)**

Plaintext, Ciphertext, keys, simple ciphers, public key cryptography, digital signatures

**Unit 3: Conventional Encryption / Secret Key Cryptography****(10 Hrs)**

Cryptography, Cryptanalysis, Cipher Structure, Encryption Algorithms, Data Encryption Standard (DES), International

Data Encryption Algorithm (IDEA), Advanced Encryption Standard (AES), Modes of Operation, Symmetric Block Ciphers,

Cipher Block Chaining (CBC), Multiple Encryption DES

**Unit 4: Public Key Cryptography****(6 Hrs)**

Basic Number Theory, Factorization, Diffie-Hellman Key Exchange, Public Key Cryptography Algorithms, RSA.

**Unit 5: Modern Digital Signatures****(4 Hrs)**

One-time signatures, Digital Signature Standard (DSS).

**Unit 6: Hashing and Message Digests****(6 Hrs)**

Hashes, Motivation and applications. Cryptographically Secure Hashing, Secure Hash Algorithm (SHA), Encryption with Message Digest (MD), MD5.

**Unit-7 Public Key Infrastructure (PKI) and Authentication****(5 Hrs)**

Overview of Authentication Systems (Password, Address, Cryptographic), Security Handshake Pitfalls, Authentication Standards, Kerberos, PKI Trust Models.

**Unit-8 Network Security****(5 Hrs)**

IP Security, Web Security, Secure Socket Layer (SSL), Transport Layer Security (TLS), Different versions of SNMPs, PGP. Intruders – Intrusion Detection – Password Management – Malwares and Related Threats – DOS

Attacks - Distributed Denial of Service Attacks.

### Unit 9. Case Studies 20 Hrs.

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India:

NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

### INTERNAL ASSESSMENT / PRACTICAL SESSIONS

#### Laboratory Work:

Practical of subject is done based on the theory of lecture.

#### Reference books :

- D. R. Stinson. *Cryptography: Theory and Practice*. CRC Press
- William Stallings, *Network Security Essentials-Applications & Standards*, Pearson.
- Charlie Kaufman, Radia Perlman, Mike Speciner, *Network Security Private Communication in a Public World*, Second Edition, 2004, Pearson.
- Matt Bishop, *Computer Security, Art and Science*, Pearson
- Bruce Schneier, *Applied Cryptography*, Pearson

### EUCSC-406 E-Commerce

Course Title	E-Commerce	Course Code	EUCSC-406
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	E-commerce	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

1. To provide basic of Electronic Commerce
2. To provide knowledge about Inter organizational commerce

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

#### Course Content:



### Unit-1 Introduction (14 Hrs)

Introduction to Electronic Commerce: Introduction of commerce, Electronic commerce framework, electronic commerce and media convergence, the anatomy of e-commerce application. The Network for Electronic Commerce: Need of network, market forces influencing the I-way, components of I-way, network access equipment, and global information distribution network. The Internet as a Network Infrastructure: Introduction, the Internet terminology, NSFNET: Architecture and Components, Internet governance: The Internet Society.

### Unit 2: Network Security (23 Hrs)

Network Security & Firewalls: Client-Server network security, security threats in client-server, firewalls and network security, data & message security, encrypted documents and electronic mail. Electronic Commerce & World Wide Web: Introduction, architectural framework for electronic commerce, WWW as an architecture, security in the web. Consumer Oriented Electronic Commerce: Introduction, consumer oriented application, mercantile process models, mercantile models from the consumer's perspective, mercantile models from the merchant's perspective. Electronic Payment Systems: Introduction, types of electronic payment system, digital token based electronic payment systems, smart cards and electronic payment systems, credit cards systems, Threat on electronic payment system.

### Unit 3: Inter-organizational commerce (8 Hrs)

Inter-organizational Commerce & Electronic Data Interchange: Introduction, EDI application in business, EDI: legal, security, and privacy issues, EDI and electronic commerce. The Corporate Digital Library: Introduction, dimensions of electronic commerce systems, types of digital documents, Issues behind document infrastructure, corporate data warehouses

### Unit 4. Case Studies 20 Hrs.

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

### INTERNAL ASSESSMENT / PRACTICAL SESSIONS

#### Laboratory Work:

Practical of subject is done based on the theory of lecture.

#### Reference books :

**Frontiers of Electronic Commerce**, 5th Edition, Kalkotia and Whinston, Pearson Education Asia

### UCSC-407 Net Centric Design

<b>Course Title</b>	Net Centric Design	<b>Course Code</b>	<b>EUCSC-407</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Computer Design	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50

University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			
The main objectives of the course are to:			
1. To provide basic of Intrinsic ASP			
2. To provide knowledge about use Server side coding			
<b>Learning Outcomes:</b>			
After completion of the course students are expected to be able to:			
➤ This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.			
➤ Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.			
<b>Course Content:</b>			
<b>Unit-1 Introduction</b>		<b>(4 Hrs)</b>	
Behind the scenes: Introduction, benefit and application of ASP; Introduction to IIS: Features, properties and application of IIS and MMC, Virtual directory properties; ASP requirements: Need for ASP, Scripting capabilities, Recognizing individuals, Database access, State maintenance, ASP extensibility.			
<b>Unit 2: Intrinsic ASP Objects</b>		<b>(6 Hrs)</b>	
The response object: ASP objects, Sending text with the response object and embedded quotes, Using variables, Other response; The request object; The application and server objects: Threads, Application variables and use, The server object, Limitation of application variables; The session object.			
<b>Unit 3: Inter-organizational commerce</b>		<b>(8 Hrs)</b>	
Inter-organizational Commerce & Electronic Data Interchange: Introduction, EDI application in business, EDI: legal, security, and privacy issues, EDI and electronic commerce. The Corporate Digital Library: Introduction, dimensions of electronic commerce systems, types of digital documents, Issues behind document infrastructure, corporate data warehouses			
<b>Unit-4 Using Components</b>		<b>(5 Hrs)</b>	
The browser capabilities component: Difference between browser, Components properties/methods, working and capabilities; Other ASP components; Sending and receiving E-mail with ASP.			
<b>Unit-5 Accessing Databases with ASP and ADO</b>		<b>(7 Hrs)</b>	
Introduction to relational databases and SQL, Introduction to ADO, Accessing data with ADO, Controlling transactions in ASP			
<b>Unit-6 ASP Applications</b>		<b>(7 Hrs)</b>	
Introduction to ASP applications, State maintenance in ASP applications, Controlling access and monitoring, Planning application, Develop a sample project using ASP.			
<b>Unit-7 Advanced ASP</b>		<b>( 8 Hrs)</b>	
Client-side scripting, Building own components, Automating active server pages, Efficiency and scalability.			
<b>Unit 8. Case Studies 20 Hrs.</b>			
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.			

<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>
<b>Laboratory Work:</b> Practical of subject is done based on the theory of lecture.
<b>Reference books :</b> Active Server Pages 3, a Russell Jones, BPB Publications, New Delhi, 2003.

## EUCSC-408 Security Audit

Course Title	Security Audit	Course Code	EUCSC-408
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Security	Semester	Seventh
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

### Objectives of the Course:

The main objectives of the course are to:

- To provide basic of security audit
- To provide knowledge about use tools in system audit

### Learning Outcomes:

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

### Course Content:

#### Unit-1 Introduction

What is Information Security & Why do you need it?– Basics Principles of Confidentiality, Integrity Availability Concepts Policies, procedures, Guidelines, Standards Administrative Measures and Technical Measures, People, Process, Technology

#### Unit- 2 Current Trends and Security

Current Trends in information Security, Cloud Computing: benefits and Issues related to info Sec. Standards available for InfoSec: Cobit, Cadbury, ISO 27001, OWASP, OSSTMM, etc - An Overview, Certifiable Standards: How, What, When, Who

#### Unit- 3 Vulnerability Management

Vulnerability, Threat and Risk, Risk Assessment and Mitigation + Quick fixes, Introduction to BCP / DRP / Incident management, Segregation and Separation of Duties & Roles and responsibilities, Electronic Transaction Act 2063

#### Unit-4 Risk assessments

Types of assessments for Information Security; VAPT of Networks, Web Appln Audits, IT assessments or audits, Assessment of Network Equipments, Assessment of Security Devices (Web Filtering, Firewalls, IDS/ IPS, Routers, Data Center Assessment, Security of Application Software, SAP Security, Desktop Security , RDBMS Security , BCP / DRP assessments , Policy reviews

#### **Unit-5 Windows and Linux Security**

Windows and Linux security, Types of Audits in Windows Environment: Server Security, Active Directory (Group Policy),

Anti-Virus, Mails, Malware, End point protection, Shadow Passwords, SUDO users, etc

#### **Unit-6 Web Application Security**

Web Application Security: OWASP, Common Issues in Web Apps, What is XSS, SQL injection, CSRF, Password Vulnerabilities, SSL, CAPTCHA, Session Hijacking, Local and Remote File Inclusion, Audit Trails, Web Server Issues, etc

#### **Unit 7. Case Studies 20 Hrs.**

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National

Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

#### **INTERNAL ASSESSMENT / PRACTICAL SESSIONS**

##### **Laboratory Work:**

Practical of subject is done based on the theory of lecture.

##### **Reference books :**

- Network Security Auditing by Chris Jackson
- Security, Audit and Control Features by ISACA

### **EUCSC-411 General Information System**

Course Title	General Information System	Course Code	EUCSC-411
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Security	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### **Objectives of the Course:**

The main objectives of the course are to:

1. To provide basic of Digital Mapping
2. To provide knowledge about Spatial data modeling and database design

<b>Learning Outcomes:</b>	
After completion of the course students are expected to be able to:	
<ul style="list-style-type: none"> <li>➤ This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.</li> <li>➤ Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.</li> </ul>	
<b>Course Content:</b>	
<b>Unit-1 Introduction</b>	<b>(6 Hrs)</b>
Overview, History and concepts of GIS, Scope and application areas of GIS, Purpose and benefits of GIS, Functional components of GIS, Importance of GPS and remote sensing data in GIS	
<b>Unit-2 Digital mapping concept</b>	<b>(3 Hrs)</b>
Map concept: map elements, map layers, map scales and representation; Map projection: coordinate system and projection system	
<b>Unit-3 Spatial data modeling and database design</b>	<b>(9 Hrs)</b>
introduction to geographic phenomena and data modeling, spatial relationships and topology, scale and resolution, vector, raster and digital terrain model, Spatial database design with the concepts of geodatabase	
<b>Unit-4 Capturing the real world</b>	<b>(8 Hrs)</b>
Different methods of data capture, map projection and spatial reference , data preparation, conversion and integration, quality aspects of spatial data, GPS, Remote Sensing	
<b>Unit- 5 Spatial analysis and visualization</b>	<b>(7 Hrs)</b>
Spatial analysis, overlay, buffering, map outputs and its basic elements	
<b>Unit-6 Introduction to spatial data infrastructure</b>	<b>(8 Hrs)</b>
SDI concepts and its current trend, The concept of metadata and clearing house, Critical factors around SDIs	
<b>Unit- 7 Open GIS</b>	<b>(4Hrs)</b>
Introduction of open concept in GIS, Open source software for spatial data analysis, Web Based GIS system, System	
Analysis and Design with GIS	
<b>Unit 8. Case Studies 20 Hrs.</b>	
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Practical of subject is done based on the theory of lecture.	
<b>Reference books :</b>	
<ul style="list-style-type: none"> <li>➤Principles of geographic information systems: An introductory textbook, international institute for Geoinformation science and Earth observation, the Netherlands- By rolf De By, Richard A. knippers, yuxian sun</li> </ul>	

<b>Course Title</b>	Advance Java Programming	<b>Course Code</b>	<b>EUCSC-412</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Security	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### **Objectives of the Course:**

The main objectives of the course are to:

1. To provide basic of Advanced Java Programming
2. To design a software using Java Programming

#### **Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

#### **Course Content:**

##### **Unit-1 Programming in Java**

**(8 Hrs)**

Introduction to Java: Java Architecture, Advantages of Java, PATH and CLASSPATH variables, Compiling and Running

Java Programs; Class and Object: Creating Classes, Interfaces, Creating Objects, Access Modifiers, Arrays, Packages,

Inheritance; Exception Handling and Threading: Try, Catch, Finally, Throws, Creating Multithreaded Programs, Thread

Life Cycle; File IO: Byte Stream Classes (Fille Input Stream and File Output Stream), Character Stream, Classes(File

Reader and File Writer), Random Access File Class

##### **Unit-2 User Interface Components with Swing**

**(10 Hrs)**

Swing and MVC Design Patterns: Design Pattern, MVC Pattern, MVC Analysis of Swing Buttons; Layout Management: Border Layout, Grid Layout, Gridbag Layout, Group Layout, Using No Layout managers, Custom layout Managers ;Text

Input: Text Fields, Password Fields, Text Areas, Scroll Pane, Label and Labeling Components ; Choice Components: Check Boxes, Radio Buttons, Borders, Combo Boxes, Sliders ; Menus: Menu Building, Icons in Menu Items, Check box and Radio Buttons in Menu Items, Pop-up Menus, Keyboard Mnemonics and Accelerators, Enabling and Design menu Items, Toolbars, Tooltips ; Dialog Boxes: Option Dialogs, Creating Dialogs, Data Exchange, File Choosers, Color

Choosers ; Components Organizers: Split Panes, Tabbed Panes, Desktop Panes and Internal Frames, Cascading and

Tiling ; Advance Swing Components: List, Trees, Tables, Progress Bars

##### **Unit- 3 Even Handling**

**(4 Hrs)**

Introduction: Standard Event Handling, Using Delegated Class, Using Action Commands, Listener Interfaces,

Adapter	
Classes ;Handling Events: Action Events, Key Events, Focus Events, Window Event, Mouse Event, Item Events	
<b>Unit-4 Database Connectivity</b>	<b>(4 Hrs)</b>
Design of JDBC: Driver Types, Typical Uses of JDBC ; JDBC Configuration: Database URLs, Driver JAR Files, Starting Database, Registering Driver class, Connecting to the database ; Executing SQL Statements: Managing Connections, Statements, Result Set, SQL Exceptions, Populating Database ; Query Execution: Prepared Statements, Reading and Writing LOBs, SQL Escapes, Multiple Results, Scrollable Result Sets, Updateable Result Sets, Row Sets and Cached Row Sets, Transactions.	
<b>Unit- 5 Network Programming</b>	<b>(5 Hrs)</b>
Networking Basics: Transmission control Protocol(TCP), User Datagram Protocol (UDP), Ports, IP Address Network Classes in JDK ; Working with URLs: Connecting to URLs, Reading Directly from URLs, InetAddress Class ; Sockets: TCP Sockets, UDP Sockets, Serving Multiple Clients, Half Close, Interruptible Sockets, Sending Email	
<b>Unit – 6 Java Beans</b>	<b>(3 Hrs)</b>
Introduction: Creating, Updating and Reading From JAR Files, Java Beans, Advantages of Java Beans, Class vs Beans, BDK and Bean Box ; Java Bean: Creating a Java Bean, Creating a Bean Manifest File, Creating a Bean JAR File, Using a New Bean, Adding Controls to Beans, Giving a Bean Properties, Creating Bound Properties, Giving a Bean Methods, Giving a Bean an Icon	
<b>Unit- 7 Servlets and Java Server pages</b>	<b>(8Hrs)</b>
Servlets: Introduction to Servlets,Life cycle of servlets, Java Servlets Development Kit, Creating, Compiling and running servlet, The servlet API ( javax. servlet package), Reading the servlet Parameters, Reading Initialization parameter, The javax. servlet.http. Package, Handling HTTP Request and Response (GET / POST Request), Using Cookies, Session Tracking ; Java Server Pages: Advantage of JSP technology (Comparision with ASP / Servlet), JSP Architecture, JSP Access Model, JSP Syntax Basic (Directions, Declarations, Expression, Scriptlets, Comments), JSP Implicit Object, Object Scope, Synchronization Issue, Exception Handling, Session Management, Creating and Processing Forms.	
<b>Unit- 8 RMI and CORBA</b>	<b>(3Hrs)</b>
Remote Method Invocation: Introduction of RMI, Architecture of RMI, Remote Objects, Creating and Executing RMI Applications ; CORBA: Introduction to CORBA, Architecture of CORBA, Functioning of CORBA Applications, CORBA Services	
<b>Unit 9. Case Studies 20 Hrs.</b>	
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka. <b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Practical of subject is done based on the theory of lecture.	



**Reference books :**

- Cay Horstmann and Grazy Cornell, Core Java Volume I-Fundamentals, Eighth Edition
- Cay Horstmann and Grazy Cornell, Core Java Volume II-Advance Features, Eighth Edition

**EUCSC-413 Information Security**

<b>Course Title</b>	Information Security	<b>Course Code</b>	<b>EUCSC-413</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Security	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

1. To provide basic of Information Security
2. To provide knowledge about use of Security Investigation

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

**Course Content:**

**Unit-1 Introduction (9 hrs)** History, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

**Unit-2 Security investigation (9 hrs)**  
Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues – An Overview of Computer  
Security – Access Control Matrix, Policy-Security policies, Confidentiality policies, Integrity policies and Hybrid policies

**Unit-3 Security analysis (9 hrs)**  
Risk Management: Identifying and Assessing Risk, Assessing and Controlling Risk – Systems: Access Control Mechanisms, Information Flow and Confinement Problem

**Unit-4 logical design (9 hrs)**  
Blueprint for Security, Information Security Policy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity.

**Unit-5 Physical design (9 hrs)**  
Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

**Unit 6. Case Studies 20 Hrs.**  
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software;



India:

NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National

Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kendra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

#### INTERNAL ASSESSMENT / PRACTICAL SESSIONS

##### Laboratory Work:

Practical of subject is done based on the theory of lecture.

##### Reference books :

1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003..

### EUCSC-415 Cyber Forensic

<b>Course Title</b>	Cyber forensic	<b>Course Code</b>	<b>EUCSC-415</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Security	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### Objectives of the Course:

The main objectives of the course are to:

- To provide basic of Cyber forensics analysis
- To provide knowledge about Information warehouse and cyber forensics cases

#### Learning Outcomes:

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

#### Course Content:

##### Unit- 1 Introduction

(7Hrs)

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services.

##### Unit-2 Computer forensics evidence and capture

(8Hrs)

Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer

Image Verification and Authentication

##### Unit-3 Computer forensic analysis

(10Hrs)

Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military–Tactics of Terrorist and Rogues – Tactics of Private Companies.

**Unit-4 Information warfare (10Hrs)**

Arsenal – Surveillance Tools- Hackers and Theft of Components- Contemporary computer Crime Identity Theft and Identity Fraud-Organized Crime & Terrorism Avenues Prosecution and Government Efforts- Applying the First Amendment to Computer Related Crime-The Fourth Amendment and Other Legal Issues.

**Unit- 5 Computer forensic cases (10Hrs)**

Developing Forensic Capabilities- Searching and Seizing Computer Related Evidence-Processing Evidence and Report Preparation - Future Issues.

**Unit 6. Case Studies 20 Hrs.**

Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.

**INTERNAL ASSESSMENT / PRACTICAL SESSIONS**

**Laboratory Work:**

Practical of subject is done based on the theory of lecture.

**Reference books :**

1. Chad Steel, "Windows Forensics", Wiley India, 2006. Majid Yar, "Cybercrime and Society", Sag ePublications, 2006. Robert M Slade, "Software Forensics", Tata Mc Graw Hill, 2004.
2. John R. Vacca, "Computer Forensics: Computer Crime Scene Investigation, Volume1, Cengage Learning, 2005.

**EUCSC-416 Advanced Networking with IPv6**

<b>Course Title</b>	Advanced Networking with IPv6	<b>Course Code</b>	<b>EUCSC-416</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Networking	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- To provide basic of Networking With IPv6 Programming

<b>Learning Outcomes:</b> After completion of the course students are expected to be able to: <ul style="list-style-type: none"> <li>➤ This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.</li> <li>➤ Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.</li> </ul>	
<b>Course Content:</b>	
<b>Unit-1 Networking Protocols</b>	<b>(6 Hrs)</b>
OSI Model, Internet IP/UDP/TCP ,Routing in the Internet & CIDR, Multicasting ,Unidirectional Link Routing	
<b>Unit-2 Next Generation Internet</b>	<b>(8 Hrs)</b>
Internet Protocol Version 6 (IPv6), History of IPv6, IPv6 Header Format, Feature of IPv6 , International trends and standards , IPv6Addressing (Unicast, Anycast & Multicast)	
<b>Unit-3 ICMPv6 and Neighbor Discovery</b>	<b>(4 Hrs)</b>
ICMPv6 General Message Format, ICMP Error and Information Message Types , Neighbor Discovery Processes and Messages, Path MTU Discovery, MLD overview	
<b>Unit-4 Security and Quality of Service in IPv6</b>	<b>(4 Hrs)</b>
Types of Threats, Security Techniques, IPSEC Framework, QoS Paradigms, QoS in IPv6 Protocols	
<b>Unit-5 IPv6 Routing</b>	<b>(5 Hrs)</b>
RIPng, OSPF for IPv6, BGP extensions for IPv6, PIM-SM & DVMRP for IPv6	
<b>Unit-6 IPv4/IPv6 Transition Mechanisms</b>	<b>(8 Hrs)</b>
Migration Strategies, Tunneling ,Automatic Tunneling, Configured tunneling, Dual Stack Translation, NAT-PT	
<b>Unit- 7 IPv6 Network and Server Deployment</b>	<b>(7Hrs)</b>
IPv6 Network Configuration in Linux and Windows Machines, IPv6 enabled WEB/PROXY/DNS/MAIL Server Configuration, IPv6 Deployment: Challenges and Risks, IPv6 and the NGN	
<b>Unit 6. Case Studies 20 Hrs.</b> Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b> Practical of subject is done based on the theory of lecture.	
<b>Reference books :</b> <ul style="list-style-type: none"> <li>➤ <i>Silvia Hagen: IPv6 Essentials, O'reilly</i></li> <li>➤ <i>Joseph Davies: Understanding IPv6; eastern economy edition</i></li> <li>➤ <i>J. F. Kurose and K. W. Ross: Computer Networking - A Top-Down Approach Featuring the Internet, AddisonWesley, 2000.</i></li> <li>➤ <i>S. A. Thomas: IPng and the TCP/IP Protocols, Wiley, 1995</i></li> <li>➤ <i>O. Hersent, D. Gurle, J.-P. Petit: IP Telephony, Addison-Wesley, 2000.</i></li> </ul>	

**EUCSC-417 Cloud Computing**

<b>Course Title</b>	Cloud Computing	<b>Course Code</b>	<b>EUCSC-417</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Networking	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

**Objectives of the Course:**

The main objectives of the course are to:

- To provide basic of Cloud computing
- To provide knowledge about Cloud network and security

**Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

**Course Content:****Unit-1 Introduction****(10 Hrs)**

Defining the Cloud, The Emergence of Cloud Computing, Cloud-Based Services, Grid Computing or Cloud Computing, Components of Cloud Computing, Cloud Computing Deployment Models: Public, Private, Hybrid, Benefits of Using a

Cloud Model, Legal Issues in Using Cloud Models, Characteristics of Cloud Computing, Evolution of Cloud Computing,

Challenges for the Cloud computing, Grid Computing, Distributed Computing in Grid and Cloud

**Unit-2 Cloud Service Models****(15 Hrs)**

Communication-as-a-Service (CaaS): Advantages of CaaS, Fully Integrated, Enterprise-Class Unified Communications, Infrastructure-as-a-Service (IaaS): Modern On-Demand Computing, Amazon's Elastic Cloud, Amazon EC2 Service

Characteristics, Monitoring-as-a-Service (MaaS), Protection Against Internal and External Threats, Platform-as-a-Service (PaaS): The Traditional On-Premises Model, The New Cloud Model, Key Characteristics of PaaS, Software-as-a-Service

(SaaS): SaaS Implementation Issues, Key Characteristics of SaaS, Benefits of the SaaS Model, Jericho Cloud Cube Model

**Unit-3 Building Cloud Networks****(9 Hrs)**

Cloud Security Challenges, Software-as-a-Service Security: Security management, Risk Management, Security Monitoring and Incident Response, Security Architecture Design, Vulnerability Assessment, Data Privacy and Security,

Application Security, Virtual Machine Security, disaster Recovery, Disasters in cloud, Disaster management

**Unit- 4 Security in Cloud Computing****(11 Hrs)**

Types of Threats, Security Techniques, IPSEC Framework, QoS Paradigms, QoS in IPv6 Protocols	
<b>Unit 5. Case Studies</b>	<b>20 Hrs.</b>
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.	
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>	
<b>Laboratory Work:</b>	
Practical of subject is done based on the theory of lecture.	
<b>Reference books :</b>	
<ul style="list-style-type: none"> <li>➤ <i>Cloud Computing: Implementation Management and Security</i>, John W. Rittinghouse and James F. Ransome (Recommended for Unit 1, 2, 3 4) <i>Joseph Davies: Understanding IPv6</i>; eastern economy edition</li> <li>➤ <i>Cloud Application architecture</i>, George Reese (Recommended for Unit 4) <i>S. A. Thomas: IPng and the TCP/IP Protocols</i>, Wiley, 1995</li> </ul>	

### EUCSC-418 Introduction to Programming with Python

<b>Course Title</b>	Introduction to Programming with Python	<b>Course Code</b>	<b>EUCSC-418</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Networking	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year

Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%
<b>Objectives of the Course:</b>			
The main objectives of the course are to: <ul style="list-style-type: none"><li>➤ To provide basic of python programming</li><li>➤ To provide knowledge about Exceptions and data structure</li></ul>			
<b>Learning Outcomes:</b>			
After completion of the course students are expected to be able to: <ul style="list-style-type: none"><li>➤ This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.</li><li>➤ Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.</li></ul>			
<b>Course Content:</b>			
<b>Unit- 1 Introduction</b>		<b>(9hrs)</b>	
Relationship between computers and programs, Basic principles of computers, File systems, Using the Python interpreter, Introduction to binary computation			
<b>Unit- 2 Data types and control structures</b>		<b>(9hrs)</b>	
Operators (unary, arithmetic, etc.), Data types, variables, expressions, and statements, Assignment statements, Strings and string operations, Control Structures: loops and decision			
<b>Unit-3 Modularization and Classes</b>		<b>(9hrs)</b>	
Standard modules, Packages, Defining Classes, Defining functions, Functions and arguments (signature)			
<b>Unit-4 Exceptions and data structures</b>		<b>(9hrs)</b>	
Data Structures (array, List, Dictionary), Error processing, Exception Raising and Handling			
<b>Unit-5 Object oriented design</b>		<b>(9hrs)</b>	
Programming types, Object Oriented Programming, Object Oriented Design, Inheritance and Polymorphism			
<b>Unit 6. Case Studies</b>		<b>20 Hrs.</b>	
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.			
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>			
<b>Laboratory Work:</b>			
Practical of subject is done based on the theory of lecture.			
<b>Reference books :</b>			
➤Starting Out with Python plus My Programming Lab with Pearson Text ,Access Card Package (3 <sup>rd</sup> Edition) Tony Gaddis ISBN-13: 978-0133862256"			

<b>Course Title</b>	Criminal Evidence and Procedures	<b>Course Code</b>	<b>EUCSC-419</b>
ECTS Credits	6	Language of Instruction	English
Department	Engineering Science & Technology	Credit Hour	3
Prerequisites	None	Type of Course	Elective
Field	Security	Semester	Eighth
Level of Course	Introductory	Year of Study	Fourth Year
Mode of Delivery	Face to Face	Lecturer	
Maximum Mark	100	Pass Mark	50
University Assessment	50%	Internal Assessment	50%

#### **Objectives of the Course:**

The main objectives of the course are to:

- To provide basic of python programming
- To provide knowledge about Exceptions and data structure

#### **Learning Outcomes:**

After completion of the course students are expected to be able to:

- This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation.
- Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities.

#### **Course Content:**

##### **Unit -1 . Introduction (3hrs)**

Principal items and classification of evidence Relevance , Admissibility , Best evidence rule , Probative ness and prejudice , Judicial discretion to exclude

##### **Unit-2. Burden and standard of Proof (3hrs)**

Legal burdens , Evidential burden , Criminal standard of proof , Civil standard of proof

##### **Unit- 3. Proof without evidence (3hrs)**

Presumptions , Judicial notice , Formal admissions

##### **Unit- 4. Division of functions between judge and jury (3hrs)**

Questions of law and fact , The voir dire and challenges to admissibility , Sufficiency of evidence

##### **Unit- 5. Witnesses (1) – Competence and compellability (3hrs)**

Accused and co-accused , Spouse , Children , Miscellaneous cases (diplomats, persons of unsound mind etc)

##### **Unit-6. Witnesses (2) – Character (3hrs)**

Relevance , Good character , Bad character

##### **Unit- 7. Witnesses (3) – General (3hrs)**

Examination in chief , Cross examination , Corroboration , Protection of vulnerable witnesses , Warnings for special witnesses in criminal cases

##### **Unit- 8. Course of evidence (3hrs)**

Rule against prior consistent statements , Refreshing memory , Hostile witnesses , Prior inconsistent statements ,  
Collateral questions , Evidence in rebuttal

##### **Unit- 9. Opinion Evidence (3hrs)**

Non-expert opinion evidence , Expert opinion evidence , Ultimate issues

<b>Unit-10. The Rule Against Hearsay</b>
Development of the rule and rationale , General principles , Exceptions
<b>Unit- 11. Admissions and confessions (3hrs)</b>
Definitions , Oppression , Voluntariness , Unreliability , Implication of co-accused , Derivative evidence , Mixed statement rule
<b>Unit- 12. Evidence unfairly or illegally obtained (3hrs)</b>
The common law , Statute , Human rights , Judicial discretion as to
<b>Unit- 13. Privilege (3hrs)</b>
General principles , Legal professional privilege , Privilege against self-incrimination , Marital privilege
<b>Unit- 14. Identification Evidence (3hrs)</b>
The General Rule , Proof of Identity of the Accused , Visual Identification , Weight of Evidence of Visual Identification
<b>Unit- 15. Similar Fact Evidence (3hrs)</b>
The General Rule , Similar Facts to Rebut Defence , Instances where Similar Fact Evidence is Admissible , Similar Fact and Corroboration , Evidence of Fact connected with the Offence
<b>Unit 16. Case Studies 20 Hrs.</b>
Nepalese Context: Cyber Laws, Implementation in the Land Reform, Human Resource Management Software; India: NICNET, Collectorate, Computer-aided Administration of Registration Department (CARD), Smart Nagarpalika, National Reservoir Level and Capacity Monitoring System, Computerization in Andra Pradesh, Ekal Seva Kentra, Sachivalaya Vahini, Bhoomi, IT in Judiciary, E-Khazana, DGFT, PRAJA, E-Seva, E-Panchyat, General Information Services of National Informatics Centre; E-Governance initiative in USA; E-Governance in China; E-Governance in Brazil and Sri Lanka.
<b>INTERNAL ASSESSMENT / PRACTICAL SESSIONS</b>
<b>Laboratory Work:</b>
Practical of subject is done based on the theory of lecture.
<b>Reference books :</b>
<ul style="list-style-type: none"><li>➤ Butterworths Hong Kong Evidence Law Handbook, 4th Edition 2016, LexisNexis/ Butterworths (ISBN 978 988 835 9806)</li><li>➤ Cross on Evidence, 10th Edition 2014, LexisNexis Australia</li><li>➤ Cross and Tapper on Evidence, Oxford University Press, 12th Edition 2010, Gardner, Criminal Evidence, 7th Edition</li></ul>