BCIS 2nd Semester - Syllabus

ENG 102 English II
BCIS, First Year, Second Semester

Course Description
The second semester English course is built on the first semester course and aims at developing students' language proficiency along similar lines. This course comprises all aspects of the English language including speaking, pronunciation, listening, reading and writing. The focus is on improving the students to communicate clearly and effectively. The syllabus for the lessons is based on the course books, but the teacher will also use lots of other materials, including suggestions from students so the content of the class can be more useful and interesting. Students are expected to participate as much as possible, but they will work individually, in pairs and groups as well as the whole class. The teacher will correct their spoken and written errors so that they become more accurate and they will progress quickly.

General Course Objectives
The general objectives of the course will be to enable students to

- extend their vocabulary
- increase their fluency
- become more accurate
- communicate in English more easily
- understand more of the world around them

Specific Course Objectives
The specific objectives of the course will be to enable students to

- make themselves understood in short turns;
- respond to questions and take part in simple conversation;
- link ideas together in a simple way;
- read and enjoy longer texts and write about them;
- understand the main points of clear standard input on familiar matters;
- deal with most situations likely to arise while traveling;
- produce connected texts on familiar topics;
- describe experiences and events, plans, hopes and ambitions;
- give brief reasons and explanations for opinions and plans;
- have enough language to get by in everyday situations;
- express themselves reasonably accurately;
- initiate and deal with familiar everyday interactions;
- link ideas into connected linear sequences;
- read and write on general topics on different themes.

Content Areas
The content will include a selection of rich interdisciplinary texts of general academic interest and business texts of various genres. The key areas are as follows: personal identification; house and home, environment; daily life; free time, entertainment; weather; travel; relations with other people; health and body care; education; shopping; food and drink; services; places; cultures; science; environment; language; and literature.

Teaching Method
The suggested teaching method is an eclectic mix of lectures, demonstrations, presentations, activities, and seminars. The specific methods for specific units are as suggested for teachers in the course books and teacher manual. Question models will be developed during the teacher orientation program and made available to the campuses.

Basic Texts
1. Grant, D., & Hudson, J. *Business Result: Pre-intermediate Student's Book*. Oxford: OUP, 2009. (including Pre-intermediate Interactive Workbook with video)
2. Nisani, M., & Lohani, S. *Adventures in English Vol II*.(3rd ed.). Kathmandu: Ekta 2013. (including Sounds of English and Stories and Poems cassettes)

References

1. Bartram, M. *Business Result: Pre-intermediate. Teacher's Book*. Oxford: OUP, 2009.
(including Pre-intermediate Class DVD and Pre-intermediate Teacher training DVD)
2. *Oxford Advanced Learner's Dictionary of Current English*. Eighth Edition. Oxford: OUP, 2010.
3. Carter, R., & McCarthy, M. *Cambridge Grammar of English*. Cambridge: CUP, 2006.

MTH 104 Mathematics II
BCIS, First Year, Second Semester

Course Objectives

The course aims to introduce students of computer science to those areas of mathematics which, from a modern point of view, are most important in connection with practical problems.

Course Description

This course emphasizes the application of mathematics to selected computer science topics and problems, using mathematical concepts.

Course Outcomes

By the end of this course, students should be able to:

- translate given physical or other information and data into mathematical model;
- obtain the solution by selecting and applying suitable mathematical methods; and
- interpret the meaning and the implications of the mathematical solutions for the original problems.

Course Contents

Unit I: Integration and its applications **12 hours**

Fundamental Formulae and rule of integration, Application of Definite integration, evaluation and approximation of definite integrals, improper integrals, quadrature, rectification, volume and surface integral.

Unit II: Differential Equations **8 hours**

Introduction, Order and Degree of a differential Equation, Solution of first order first degree differential equations: variable separable, homogeneous, linear, exact linear differential equation, First and second order linear differential equation with constant coefficient, initial and boundary value problems

Unit III: Infinite Series **10 hours**

Sequence, series Convergence Test of infinite Series, direct comparison test, limit comparison test, P-series test, De Almbert's ratio test, Cauchy root test, Alternating series test, Interval and radius of convergence.

Unit IV: Fourier Series and Integrals **8 hours**

Definitions of Fourier series and coefficient(Without proof) , periodic function ,odd and even functions, half range series(sine and cosine Fourier series),Fourier integral, Fourier sine and cosine integral.

Unit V: Functions of Complex Variable **10 hours**

Basic definitions, functions of a complex variable, Algebra of complex numbers, Properties of complex numbers, Conjugate of a complex number, Modulus of a complex numbers and its properties, Argand diagram, Polar representation, Square roots of a complex number, De'Moivres's theorem (statement only) and its application to find up to cube roots of a complex number, limits, continuity and differentiation, Cauchy-Riemann equations, analytical functions, harmonic functions, complex exponential, trigonometric and hyperbolic functions.

Basic Texts

1. Kreyszig, E. *Advanced Engineering Mathematics.* New Delhi: John Wiley & Sons Inc.
2. Thomas, G. B. Jr., & Finney, R. L. *Calculus and Analytical Geometry.* New Delhi: Narosa Publishing House.

References

1. Sastry, S. S. *Engineering Mathematics.* New Delhi: Prentice Hall of India.
2. Grewal, B. S. *Higher Engineering Mathematics.* New Delhi: Khanna Publications.

ECO 201 Introductory Macroeconomics

BCIS, First Year, Second Semester

Course Objectives

This course is designed to reinforce and expand students' understanding of the basic macroeconomic theory. It aims to provide students with an introductory-level treatment of economic theory with emphasis on the technique beside the results. Besides, it helps the students to master the basic macroeconomic tools used by the prominent economists in practice, and makes them able to apply these tools in a variety of contexts to set up and solve macroeconomic problems.

Course Contents

The first two units of this course examine the two fundamental macroeconomic topics, viz. national income & employment. Then the course focuses on various macroeconomic theories, viz. consumption, saving and investment functions and macroeconomic equilibrium as well as macroeconomic issues and policies viz. inflation, trade cycle and fiscal monetary policies. The major concentrations of this course are: national income and employment, consumption, saving and investment, aggregate demand and aggregate supply, determinations of macroeconomic and general equilibrium of an economy.

Course Outcomes

By the end of this course, students should be able to:

- explain basic macroeconomic terminology (as e.g. national income, aggregate demand, aggregate supply, trade cycle, inflation etc.) in a comprehensive and intuitive way;
- describe and justify the main assumptions behind simple macroeconomic models as e.g. the aggregate demand and aggregate supply model, saving investment equality model, etc;
  - illustrate diagrammatically these models and perform policy experiments;
  - derive numerically macroeconomic instruments and learn how to use them in practice

  (e.g. national income, multiplier, inflation etc.);
- solve algebraically simple macroeconomic models in order to determine the equilibrium economic variables, and reflect on the solutions with a critical mind; and
- use economic intuition to explain topical policy issues (e.g. fiscal policy, monetary policy and fiscal-monetary mix).

Course Contents

Unit I: Nature and Scope of Macroeconomics **4 hours**

Meaning and Concept of macroeconomics; Basic issues in macroeconomics: unemployment, inflation, business cycles, and economic growth; Scope and importance of macroeconomics; Distinction and interdependence between microeconomics and macroeconomics.

Unit II: National Income: Concept and Measurement **10 hours**

Circular Flow of Income and Expenditure: two, three and four sector economy, Meaning, definitions and various concept of National income, Methods of computing/measuring National income, Difficulties in the measurement of National income, Importance of National income analysis.

Unit III: Theories of Employment **5 hours**

Classical theory of employment and output, Summary of the classical model (including Say's law and Quantity theory of money), Principle of Effective Demand: Aggregate demand price, Aggregate supply price, Determination of effective demand, Importance of effective demand, Repudiation of Say's law and Full Employment Theory.

Unit IV: Consumption Function, Saving Function and Investment Functions **7 hours**

Meaning of consumption function, Keynes's psychological law of consumption, Concept of MPC and APC, Determinants of the consumption function, Measures to raise the propensity to consume, Saving

function, Meaning of capital and investment, Types of investment, Determinants of investment, Marginal Efficiency of Capital (MEC), Marginal Efficiency of Investment (MEI); Relation between MEC and the MEI.

Unit V: Macro-Economic Equilibrium **12 hours** Meaning and concepts goods market, Determination of equilibrium level of income in two-, three- and four- sector economy (Goods market equilibrium) with aggregate expenditure and aggregate output, Equilibrium with saving and investment, Concept of multiplier, Determination of multiplier in two-, three- and four-sector economy, Leakages of multiplier, Importance of multiplier. IS and LM Function: General Equilibrium of Product and Money Markets, The product (goods) market, Deriving the IS Curve, The money market, Deriving the LM Curve, Shift in the IS and LM functions, Changes in general equilibrium, Simultaneous shift in the IS and LM function, Derivation of aggregate demand curve (AD), Derivation of aggregate supply curve (AS), Equilibrium with AD-AS, change in macroeconomic equilibrium with shift in AD and AS.

Unit VI: Macro-Economic Phenomenon and Policies **10 hours** Inflation: Meaning and measures of inflation, inflationary gap, Causes of inflation, Effects of Inflation, The Phillips curve: The short-run relationship between unemployment and inflation, Business Cycles: Meaning of business cycles (economic fluctuations), Phases of a typical business cycle: Recovery; prosperity; recession, and depression, Counter cyclical measures, Fiscal and Monetary Policies: Objectives, tools and policy measures in developing countries.

Basic Texts

1. Mankiw, N. G. *Macroeconomics.* Dryden Press, Harcourt Brace College Publishers. (Indian Edition)
2. Samuelson, P. A. *Macroeconomics*. New Delhi: Tata McGraw Hill.

References

1. Donbush, R., Fisher, S. & Startz, R. *Macroeconomics*, New Delhi: Tata McGraw Hill.
2. Salvatore, D. *Macroeconomics*. New Delhi: Oxford University Press.
3. Jhingan, M. L. *Macroeconomics.* New Delhi: Vrinda Publications.
4. Dwivedi, D. N. *Macroeconomics: Theory and Policy* . New Delhi: Tata McGraw Hill.

CMP 162 Digital Systems

BCIS, First Year, Second Semester

Course Objectives

The aim of the module is to introduce to the students the topics that include combinational and sequential circuit analysis and design, digital circuit design optimization methods using random logic gates, multiplexers, decoders, registers, counters and programmable logic arrays.

Course Description

This module introduces the concepts of the design and implementation of digital circuits. Laboratory xperiments will be used to reinforce the theoretical concepts discussed in lectures. The lab experiments will involve the design and implementation of digital circuits. Emphasis is on the use computer aided tools in the design, simulation, and testing of digital circuits.

Course Outcomes

By the end of this course, students should be able to:

- use Boolean algebra and resulting logic for control and data paths;
- do simple design with basic digital building blocks such as multiplexors, selectors, and shift registers and flip flops;
- define the problem (Inputs and Outputs), write its functions;
- Implement functions using digital circuit (Combinational or Sequential); and
- use simulation software for testing the designed circuit.

Course Contents

Unit I: Number System **4 hours** Decimal, Binary, Octal and Hexadecimal Number System; Basic arithmetic operation of above number systems (addition, subtraction, multiplication etc); 1's and 2's compliment; Gray codes and alphanumeric characters; Binary coded decimal and its uses.

Unit II: Boolean Algebra and Logic Gates **6 hours** Definition of a digital system; Basic theorem and properties of Boolean Algebra; Boolean functions; Digital logic gates and truth tables; Fundamental relationship of basic gates.

Unit III: Simplification of Boolean Functions **6 hours** The Karnaugh map; Two and three variable maps; Four variable maps Product of sums simplification; NAND and NOR implementation; Don't care conditions; Practical design Steps.

Unit IV: Combinational Logic with MSI and LSI **8 hours** Introduction; Design procedures; Half and full adders; Subtractors; Code conversion; BCD to seven segment decoders; Encoder / Decoder; Multiplexers and Demultiplexers.

Unit V: Sequential Logic **9 hours** Introduction; Flip-Flops: RS, D-Type, Clocked D-Type, J-K, and T type flip-flop, Master Slave, Triggering of flip flops (positive, negative and level trigger); Analysis of clocked sequential Circuits; State reduction and assignment; Flip-Flips excitation Tables and design procedures.

Unit VI: Registers and Counters **8 hours** Memories, Classification of memories, General storage method, Types of memories, Introduction Shift Registers (Serial in Serial Out, Serial in Parallel Out, Parallel in parallel Out, Parallel in Serial Out); Ripple counters; Design of divide by N counters; Synchronous Up/Down Counters; Timing Sequences; Buffers.

Unit VII: Logical Families **2 hours** Overview of semiconductor technologies used for IC fabrication, Basic idea of TTL, ECL I2L, PMOS, NMOS, CMOS and their application, Levels of integration (SSI, MSI, LSI, VLSI, ULSI).

Unit VIII: Central Processor Organization **5 hours** Processor Bus Organization; Arithmetic Logic Unit (ALU); Flags, Stack Organization and Memory Stack formats.

Lab Works

1. Verification of basic gates function (OR, AND, NAND, NOR, EX-OR, EX_NOR)
2. Multiplexers and demultiplexers (using the principle learned in K-Map).
3. Encoders and decoders (using the principle learned in K-Map)
4. Adder and subtractors, in this laboratory students will construct a full adder and subtractor using basic design principle
5. RS, D-Type, clocked D and master slave. In this laboratory students will design and verify the concepts of different flip-flops based on basic logic gates.
6. Design of counters (decade counters and binary counters). Students will design decade and binary counters verify the concepts using various tools.
7. Design of shift registers (serial in serial out and parallel in parallel out)

Basic Texts

1. Morris Mano: *Digital Logic and Computer Design,* Pearson Prentice
2. T. L Floyd: *Digital Fundamentals*, Pearson International Edition
3. Malvino: *Digital Computer Electronics,* Pearson Prentice

CMP 163 Object Oriented Programming

BCIS, First Year, Second Semester

Course Objectives

This course aims to provide an introduction to Object Oriented Programming concept using Java. At the end of this course, students should be able to write Java applications utilizing the object- oriented concepts introduced in this course.

Course Description

The course covers the basic fundamentals of Java programming like classes, objects, inheritance, exception handling, etc. as well as advanced topics like interfaces, polymorphism, multithreading, file-handling and java swing. The topic covered will also introduce the Object Oriented paradigms like Inheritance, Abstraction, Encapsulation and Polymorphism using Java.

Course Outcomes

By the end of this course, students should be able to:

- understand the concept of OOP as well as the purpose and usage principles of inheritance polymorphism, encapsulation and method overloading;
- identify classes, objects, members of a class and the relationships among them needed for a specific problem; and
- create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling).

Prerequisite

This is the first course on Object-Oriented Programming using Java. Students are not expectedto be familiar with either Object Oriented Programming or Java but knowledge of basic programming concept is required. Students should have successfully completed the Programming Language (CMP 161).

Course Contents

Unit I: Introduction to Java **3 hours**

Java Language and History, Features of Java (*Object-Oriented, Robust, Secure, Architecture Neutral, Portable, Interpreted, Multithreaded, Dynamic, Performance*), Common Misconceptions about Java, Java Virtual Machine, JDK, JRE, Java Program Structure

Unit II: Java Programming Basics **4 hours**

Keywords and Identifiers, Java's Primitive Data Types (*integer, floating-point, character, boolean),* Literals, Variables, Variable Declaration and Initialization, Scope and Lifetime of a Variable, Operators (*arithmetic, increment-decrement, relational-logical, assignment, bitwise),* Type Casting, Operator Precedence, Java Expressions, Strings, Arrays, Control Statements (*if statement, nested ifs, if-else-if, switch*), Loops (*for, while, do-while, break, continue*), Nested Loops

Unit III: Classes and Objects **6 hours**

Introduction to Object Oriented Programming, Functional vs Object-Oriented Programming, Features of Object-Oriented Programming, Classes and Objects, Constructors, Methods and Instance Variables, Methods Arguments and Return Values, Method Overloading, Access Modifiers, Static and Final Members, Garbage Collection and Finalizers, this keyword, Inner Classes

Unit IV: Inheritance, Interfaces and Packages **8 hours**

Introduction, Member Access and Inheritance, Constructor and Inheritance, super keyword, Multi-level Hierarchy, Method Overriding, Polymorphism and Dynamic Binding, Abstract Classes, Final Classes and Methods, Object superclass, Object Wrappers and Autoboxing, Interfaces, Creating and Implementing an Interface, Interface and Abstract Classes, Implementing Multiple Interfaces, Extending an Interface, Packages, Packages Scope, Importing Package and Class, Static Imports, Creating a Package

Unit V: Exception Handling and Multithreading **8 hours**

Exceptions and Errors, Exception Hierarchy, Catching Exceptions: try and catch, Catching Multiple Exceptions, finally Clause, Throwing an Exception (throw, throws), Analyzing Stack Trace Elements, Java's Built-in Exceptions, Creating Exception Subclasses, Introduction to multithreading, Thread Class and

Runnable Interface, Multiple Threads, Interrupting Threads, is Alive() and join(), Thread Priorities, Synchronization, Deadlock, Thread Communication, Suspend, Resume and Stop Threads

Unit VI: Java IO **6 hours**

Byte and Character Streams, Byte Streams and Character Streams, Reading from and Writing to Console, Reading from and Writing to File, *Input Stream, Output Stream, File Input Stream, File Output Stream, Data Input Stream, Data Output Stream, Buffered Input Stream, Buffered Output Stream, Reader, Writer, File Reader, File Writer, Buffered Reader, Buffered Writer,* Random- Access Files, Files and Directories

Unit VII: Java Collections and Java API Library **7 hours**

Introduction to Java Collection Interface, List, Set, Map, Array List, Linked List, Hash Set, Hash Map, Iterators, String Handling (*equals(), substring(), replace(), index Of(), last Index Of(), replace(), trim(), to Upper Case(), to Lower Case()),* String Concatenation, String Buffer and String Builder, Byte, Short, Integer, Long, Float, Double, Boolean class, Calendar and Simple Date Fromat class, Formatting Strings, Numbers, Date and Time, Random class

Unit VIII: Java Swing **6 hours**

Introduction, Components and Containers, Layout Manager, Text Input and Choice Components, Menus, Dialog Boxes, Event Handling

Lab Works

1. Installation of JDK and Netbeans/Eclipse
2. First program using Java
3. Variables, Data-type, Strings, Arrays, Control Statements and Loops
4. Classes and Objects, Inheritance
5. Interface and Polymorphism
6. Exception Handling
7. Java IO - 1
8. Multithreading
9. Using Array List, Hash Map, Iterators
10. String, String Buffer, Calendar, Random
11. Java Swing

Basic Text

Schildt, H. & Skrien, D. *Java Fundamentals – A Comprehensive Introduction.* New Delhi: Tata McGraw Hill.

References

1. Deitel, A. M. & Deitel, P. J. *Java How to Program.* New Delhi: Pearson-Prience Hall, India.
2. Horstmann, C. S. & Cornell G, *Core Java Volume 1 – Fundamentals – Sun Microsystem.*