BACHELOR OF COMPUTER INFORMATION SYSTEMS (BCIS)

CURRICULUM

Faculty of Management Studies
Pokhara University

2013
POKHARA UNIVERSITY
BACHELOR OF COMPUTER INFORMATION SYSTEMS (BCIS)

Program Objectives
The Bachelor of Computer Information System (BCIS) program of Pokhara University provides students with foundational knowledge and practical skills needed in various areas of information system, computer technology, and management. The program aims at developing a student's intellectual ability, technical skills, and managerial applications through an appropriate blending of computer, information technology and business courses. The objectives of the program are to:

- train students in e-business systems which are designed and managed by professionals with a sound knowledge in technology,
- appreciate the underlying technologies which often directly impact business goals of e-business system,
- instill a belief that all existing technologies in back-end systems can be integrated by appropriate middleware,
- develop the preference for using established technology standards where possible,
- develop a sound knowledge base and proper conceptual underpinnings of computer, information technology and management,
- accelerate understanding of business organizations in Nepal and the wider world,
- increase data processing and problem-solving skills,
- develop competency in the application of information, including the ability to use electronic media and computers, to solve organizational problems,
- promote the ability to work in teams and individually.

Curricular Structure
The coursework gives students a broad and holistic view of the complexity of issues in today’s information management and business environment. This program provides the basis for career growth, and also prepares for higher studies. The curriculum comprises the following five distinct components:

- **Foundation Courses**: These courses develop students’ communication skill and provide them with strong foundation in economics, statistics, mathematics, and legal environment of business and technology.
- **Management Core Courses**: These courses will help students to understand the basic principles and practices in the functional areas of management.
- **CIS Core Courses**: These courses will help students to understand principles and practices in the functional areas of computer information management specifically.
- **Elective Courses**: The elective courses will help students to develop specialized and focused skills in the areas of their choice.
- **Project Work and Internship**: Students are required to undertake independent capstone project that involve fieldwork and empirical analysis of the information collected from the field. After that they will prepare a project report on a prescribed format. The internship provides students with an opportunity to gain real-life experience by working in an organization for six to eight weeks.
Program Features
The BCIS is a four-year program structured in eight semesters. A student needs to complete 124 credit hours of course work, project work and internship for graduation.

Besides lectures, the classes are facilitated by case studies, group discussions, project assignments, field visits, class presentations and other teaching methods. In order to develop communication and interpersonal skills, students are emphasized to participate in class activities, group discussions and individual presentations.

The medium of instruction and examination for this program will be English, and a student is expected to have good English language proficiency with acceptable communication skill.

The Semester System
The prominent feature of the semester system is the continuous evaluation of a student's performance, and flexibility given to the students to progress at pace suited to his/her individual ability as per the credit requirements.

The credit hour assigned to each course of this program varies depending on its lecture, tutorial and practical work hours in a week. One lecture/contact hour per week per semester is assigned one credit. That is, a three credit hours course has 48 class hours. A faculty member is assigned to teach each of the courses. If the course is taught by more than one faculty member, then one of the members is designated as the coordinator of that course.

Entry Requirements and Admission Procedures
Eligibility
The entry requirement for a new student in BCIS will be Intermediate or Higher Secondary level (10+2) or Proficiency Certificate Level (PCL), or equivalent as recognized by Pokhara University. In addition, the student must pass the entrance test conducted by the concerned college.

Documents Required
The applicant is required to submit the following documents with the application form made available by the concerned college/school by paying a predetermined fee:
- Completed and signed BCIS application form.
- Official transcripts from the academic institutions previously attended.

Certificates of all degrees should be photocopied and submitted with proper attestation. Enrolment is conditional upon completion of all admission formalities including payment of all fees as determined by the college. Incomplete applications shall not be processed.

Admission Procedures
A notice inviting applications for admission is publicly announced. Application forms and information brochures are provided, on request, after the payment of the prescribed fee.

The concerned college scrutinizes the application. The eligible candidates are informed to take the entrance test. The date and time for the entrance test are informed to the applicants by the
concerned colleges. The college may also interview the candidates for the final selection for admission.

The candidates who are given provisional admission under special conditions are required to submit all necessary documents within a month after their regular classes begin. A student who fails to do so will have his/her admission cancelled.

**Academic Schedule and Course Registration**
An academic session consists of two semesters. The Fall Semester starts in September and the Spring Semester starts in March. Students are normally admitted to the program in the Fall Semester.

Students are required to register the courses by themselves from the concerned college at the beginning of each semester. Registration in absence may be allowed only in rare cases at the discretion of the principal. In normal cases, a student’s nominee will not be allowed for course registration of the concerned student, but he/she may complete other formalities.

**Addition and Withdrawal from the Course**
A student will have the option to add or drop from the course. This can, however, be done only during the first three weeks of the semester.

A student wishing to withdraw from a course should apply on the prescribed form within one month of the start of the semester.

**Attendance Requirements**
A student must attend every lecture, tutorial, seminar and practical class. However, to accommodate for late registration, sickness and other contingencies, the attendance requirements will be a minimum of 80% of the classes actually held. If a student is absent in the class for more than four weeks without the permission of the concerned authority, his/her name will be removed from the college roll.

**Normal and Maximum Duration of Study**
The duration for the completion of the program is as follows:
- Normal duration: 4 Years (8 Semesters)
- Maximum Duration: 8 Years

A full-time student has to take a minimum of 12 credits.

**Evaluation System**
A student’s academic performance in a course is evaluated in two phases:
- Internally by the concerned faculty member through quizzes, tutorials, lab works, home assignments, class tests, class participation, term papers, formal internal examination etc.
- Externally by the Office of the Controller of Examinations through semester-end examinations.

A fifty percent weight is given to each internal and external evaluation (semester-end examination). A student is required to pass the internal and external evaluations independently.
The final grade awarded on the basis of his/her consolidated performance in both internal and external evaluations.

A student will get NOT QUALIFIED (NQ) status in the internal evaluation if his/her performance falls below the minimum requirement. Such students will not be allowed to appear in the semester-end examination of that particular course.

**Grading System**

Pokhara University follows a four-point letter grade system. The letter grades awarded to students will be as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Point</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
<td>Excellent</td>
</tr>
<tr>
<td>A-</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
<td>Good</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>B-</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>C+</td>
<td>2.3</td>
<td>Satisfactory</td>
</tr>
<tr>
<td>C</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>C-</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td>D+</td>
<td>1.3</td>
<td>Minimum Requirement</td>
</tr>
<tr>
<td>D</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>0</td>
<td>Fail</td>
</tr>
</tbody>
</table>

In some rare and unusual circumstances, if a student is unable to complete all the required works for the course, he/she may be temporarily marked with an incomplete grade “I”. If all the required works are not completed within the following semester, the letter “I” will be automatically converted into “F”. The performance of a student is evaluated in terms of the following two indices:

- The semester grade point average (SGPA) which is the grade point average for the semester and is given by:
  \[
  \text{SGPA} = \frac{\text{Total honor points earned in a semester}}{\text{total number of credit hours taken in a semester}}
  \]

- The cumulative grade point average (CGPA) which is the grade point average for all completed semester and is given by:
  \[
  \text{CGPA} = \frac{\text{Cumulative total honor points earned}}{\text{cumulative total number of credit hours taken}}
  \]

**Repeating a Course**

A course may be taken only once for grade. Since passing of all courses individually is a degree requirement, the student must retake the failing course when offered and must successfully complete the course. A student will be allowed to retake maximum of two courses to achieve a minimum CGPA of 2.0. The grade earned on the retake examination will substitute the earlier grade earned by the student in that course. A student can retake a course only when it is offered by the college/University.
Credit Transfer and Withdrawal
Up to 25% of the total credit hours of the courses completed in an equivalent program of a recognized institution may be transferred/ waived for credit on the recommendation of the principal of the college. For the credit transfer, a student must receive a "B" or above grade in respective course. Courses taken earlier than five years from the time of transfer may not be accepted for the credit transfer. However, a student transferring from one program to another program of Pokhara University may receive a credit transfer of all the compatible courses completed with at least a "C" grade.

A student may apply for withdrawal from the entire semester only on medical grounds. The principal will examine the application for semester withdrawal, and depending on the gravity of the case, he/she will make the decision. No partial withdrawal from the courses registered in a semester will be considered.

Project Work
Students are required to undertake two mini projects, and one independent and comprehensive capstone project that involves fieldwork and its empirical analysis. At the end, the students must prepare a report of this work in the prescribed format and submit it to the authorized person/body. The objective of these project works is to develop students’ skills in research, particularly in areas of data collection, processing, analysis, and report writing. These reports will be evaluated by the concerned authority.

Internship
Students need to do an internship as approved by the college. The purpose of internship is to provide students with the real-life on-the-job exposure and an opportunity to apply theoretical concepts in real-life situation. Students' interest and intended area of concentration are taken into account while making the internship placement decisions.

Unfair Means
Students are strictly forbidden from adopting unfair means in class assignments, tests, report-writing and final examination.

The following would be considered as adoption of unfair means during examination:
- Communication with fellow students for help
- Copying from another student’s script/report/paper.
- Copying from disk, palm of hand, mobile phone, or other incriminating documents.
- Processing from any incriminating documents, whether used or not.
- Any direct or indirect approach to influence teacher for the grade.
- Unruly behavior which disrupts academic program.

If the instructor detects a student using unfair means, the student may be given an ‘F’ at the discretion of the Examination Board. Adoption of unfair means may further result in the expulsion of the student from the program, college and the University as well.

Provision for Re-totaling and Rechecking
Students may apply for re-totaling or rechecking of their grades as per University rules.
Dismissal from the Program
A student must obtain 2.0 CGPA at the undergraduate level. If his/her performance in the past semesters does not show the possibility of maintaining this CGPA, he/she may be dismissed from the program.

Degree Requirements
For graduation a student should:
- earn at least a ‘D’ grade in each course as specified in the grading system section,
- complete the internship with ‘Pass’ grade,
- complete all the courses, project work and internship as specified in the curricular structure, section within the maximum time period mentioned in the duration of study section,
- maintain at least 2 CGPA.

Distinction and Dean’s List
A student who obtains 3.6 CGPA or above will receive the BCIS degree with distinction. The Dean’s list recognizes outstanding academic performances in the FMS. To qualify, a student must have 3.7 CGPA or above.

CURRICULAM STRUCTURE

Foundation Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 101</td>
<td>English I</td>
<td>3</td>
</tr>
<tr>
<td>ENG 102</td>
<td>English II</td>
<td>3</td>
</tr>
<tr>
<td>MTH 103</td>
<td>Mathematics I</td>
<td>3</td>
</tr>
<tr>
<td>MTH 104</td>
<td>Mathematics II</td>
<td>3</td>
</tr>
<tr>
<td>STT 101</td>
<td>Business Statistics</td>
<td>3</td>
</tr>
<tr>
<td>STT 201</td>
<td>Data Analysis and Modeling</td>
<td>3</td>
</tr>
<tr>
<td>ECO 101</td>
<td>Introductory Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>ECO 201</td>
<td>Introductory Macroeconomics</td>
<td>3</td>
</tr>
<tr>
<td>SOC 101</td>
<td>Fundamentals of Sociology</td>
<td>3</td>
</tr>
<tr>
<td>PSY 101</td>
<td>General Psychology</td>
<td>3</td>
</tr>
</tbody>
</table>

(30 Credit Hours)

Management Core Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC 121</td>
<td>Financial Accounting I</td>
<td>3</td>
</tr>
<tr>
<td>FIN 131</td>
<td>Essentials of Finance</td>
<td>3</td>
</tr>
<tr>
<td>LAW 291</td>
<td>Legal Aspects of Business and Technology</td>
<td>3</td>
</tr>
<tr>
<td>MGT 241</td>
<td>Principles of Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 211</td>
<td>Fundamentals of Organizational Behaviour</td>
<td>3</td>
</tr>
<tr>
<td>MGT 311</td>
<td>Fundamentals of Operations Management</td>
<td>3</td>
</tr>
<tr>
<td>MGT 314</td>
<td>Management of Human Resources</td>
<td>3</td>
</tr>
<tr>
<td>MGT 412</td>
<td>Strategic Management</td>
<td>3</td>
</tr>
<tr>
<td>MKT 241</td>
<td>Principles of Marketing</td>
<td>3</td>
</tr>
<tr>
<td>RCH 311</td>
<td>Business Research Methods</td>
<td>3</td>
</tr>
</tbody>
</table>

(30 Credit Hours)
### CIS Core Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP 161</td>
<td>Programming Language</td>
<td>3</td>
</tr>
<tr>
<td>CMP 162</td>
<td>Digital System</td>
<td>3</td>
</tr>
<tr>
<td>CMP 163</td>
<td>Object Oriented Language (Java)</td>
<td>3</td>
</tr>
<tr>
<td>CMP 261</td>
<td>System Analysis and Design</td>
<td>3</td>
</tr>
<tr>
<td>CMP 262</td>
<td>Database Management System</td>
<td>3</td>
</tr>
<tr>
<td>CMP 263</td>
<td>Computer Architecture and Microprocessors</td>
<td>3</td>
</tr>
<tr>
<td>CMP 264</td>
<td>Numerical Methods</td>
<td>3</td>
</tr>
<tr>
<td>CMP 265</td>
<td>Internet Technology (Web Programming)</td>
<td>3</td>
</tr>
<tr>
<td>CMP 266</td>
<td>Operating Systems</td>
<td>3</td>
</tr>
<tr>
<td>CMP 267</td>
<td>Data Communication and Networks</td>
<td>3</td>
</tr>
<tr>
<td>CMP 268</td>
<td>Mobile Computing (Programming)</td>
<td>3</td>
</tr>
<tr>
<td>CMP 361</td>
<td>Electronic Commerce</td>
<td>3</td>
</tr>
<tr>
<td>CMP 362</td>
<td>Computer Graphics and Image Processing</td>
<td>3</td>
</tr>
<tr>
<td>CMP 363</td>
<td>Information System Security</td>
<td>3</td>
</tr>
<tr>
<td>CMP 364</td>
<td>IT Project Management</td>
<td>3</td>
</tr>
<tr>
<td>CMP 365</td>
<td>Digital Economy</td>
<td>3</td>
</tr>
</tbody>
</table>

### Electives

(Any two of the following courses)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMP 461</td>
<td>Dot Net Technology</td>
<td>3</td>
</tr>
<tr>
<td>CMP 462</td>
<td>Routing and Switching</td>
<td>3</td>
</tr>
<tr>
<td>CMP 463</td>
<td>System Administration on Windows and Linux</td>
<td>3</td>
</tr>
<tr>
<td>CMP 464</td>
<td>Mobile and Wireless Communication System</td>
<td>3</td>
</tr>
<tr>
<td>CMP 465</td>
<td>Cloud Computing</td>
<td>3</td>
</tr>
<tr>
<td>CMP 466</td>
<td>Distributed Database Management System</td>
<td>3</td>
</tr>
<tr>
<td>CMP 467</td>
<td>Management of Technology</td>
<td>3</td>
</tr>
<tr>
<td>CMP 468</td>
<td>Geographical Information System</td>
<td>3</td>
</tr>
</tbody>
</table>

### Project Work and Internship

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRJ 291</td>
<td>Minor Project I</td>
<td>1</td>
</tr>
<tr>
<td>PRJ 391</td>
<td>Minor Project II</td>
<td>2</td>
</tr>
<tr>
<td>PRJ 493</td>
<td>Project Work</td>
<td>4</td>
</tr>
<tr>
<td>INT 393</td>
<td>Internship</td>
<td>3</td>
</tr>
</tbody>
</table>
# Pokhara University
## BCIS Program
### CURRICULAR STRUCTURE AND COURSE CYCLE

<table>
<thead>
<tr>
<th>Semester I</th>
<th>Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Course Description</strong></td>
</tr>
<tr>
<td>ENG 101</td>
<td>English I</td>
</tr>
<tr>
<td>MTH 103</td>
<td>Mathematics I</td>
</tr>
<tr>
<td>PSY 101</td>
<td>General Psychology</td>
</tr>
<tr>
<td>ECO 101</td>
<td>Introductory Microeconomics</td>
</tr>
<tr>
<td>MGT 111</td>
<td>Principles of Management</td>
</tr>
<tr>
<td>CMP 161</td>
<td>Programming Language</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>18</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester III</th>
<th>Semester IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Course Description</strong></td>
</tr>
<tr>
<td>STT 101</td>
<td>Business Statistics</td>
</tr>
<tr>
<td>CMP 264</td>
<td>Numerical Methods</td>
</tr>
<tr>
<td>CMP 261</td>
<td>System Analysis and Design</td>
</tr>
<tr>
<td>SOC 101</td>
<td>Fundamentals of Sociology</td>
</tr>
<tr>
<td>CMP 263</td>
<td>Computer Architecture and Microprocessor</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester V</th>
<th>Semester VI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Course Description</strong></td>
</tr>
<tr>
<td>FIN 131</td>
<td>Essentials of Finance</td>
</tr>
<tr>
<td>CMP 266</td>
<td>Operating Systems</td>
</tr>
<tr>
<td>CMP 267</td>
<td>Data Communications and Networks</td>
</tr>
<tr>
<td>MGT 314</td>
<td>Management of Human Resources</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester VII</th>
<th>Semester VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Course Description</strong></td>
</tr>
<tr>
<td>RCH 311</td>
<td>Business Research Methods</td>
</tr>
<tr>
<td>CMP 363</td>
<td>Information System Security</td>
</tr>
<tr>
<td>CMP 364</td>
<td>IT Project Management</td>
</tr>
<tr>
<td>INT 393</td>
<td>Internship</td>
</tr>
<tr>
<td></td>
<td>Elective I</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester VIII</th>
<th>Semester VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Course Code</strong></td>
<td><strong>Course Description</strong></td>
</tr>
<tr>
<td>RCH 311</td>
<td>Business Research Methods</td>
</tr>
<tr>
<td>CMP 363</td>
<td>Information System Security</td>
</tr>
<tr>
<td>CMP 364</td>
<td>IT Project Management</td>
</tr>
<tr>
<td>INT 393</td>
<td>Internship</td>
</tr>
<tr>
<td></td>
<td>Elective I</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

**Note:** The total credit hours for each semester are as follows: Semester I - 18, Semester II - 15, Semester III - 15, Semester IV - 16, Semester V - 15, Semester VI - 17, Semester VII - 15, Semester VIII - 13.
Course Description
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
- understand and use basic everyday phrases;
- introduce themselves and ask and answer questions about personal details;
- interact with a co-operative partner;
- acquire a basic repertoire of words and phrases;
- demonstrate limited grammatical control;
- manage short utterances;
- understand sentences and frequently used expressions related to immediately relevant areas;
- communicate in simple and routine tasks;
- describe in simple terms aspects of their background, immediate environment and matters of personal interest;
- use basic sentence patterns;
- use simple structures correctly; and
- read and write on general topics on different themes.

Course 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; ancient tales, animals, television, cross-cultural bridges, anthropology, and literature.
Teaching Methods
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. Question models will be developed during the teacher orientation program and made available to the campuses.

Basic Texts

References
MTH 103 Mathematics I  
BCIS, First Year, First Semester

Course Objectives
The objective of this course is to familiarize students with the basic mathematical tools with emphasis on applications to business and economics situations. The course specifically aims to enable students to develop proficiency in the application of mathematical tools to solve business problems.

Course Description
This course basically deals with mathematical concepts like set theory and number system, functions and graphs, derivatives and their applications, vectors, matrices and determinants, and permutations and combinations.

Course Outcomes
By the end of this course, students should be able to:
- use the language of mathematics to communicate ideas;
- demonstrate proficiency in conceptual understanding, and adaptive reasoning;
- solve quantitative problems and perform quantitative investigations in which they discover ideas and gain insights that develop questioning and solution-building skills; and
- use mental strategies and technology accurately and appropriately.

Course Contents

Unit I: Set Theory and Real Number System  
Sets, Types of sets, Venn diagram, Set operations, Laws of algebra of sets (without proof), Number of elements in a set Real number system, Representation of real numbers on the real line, Properties of real numbers (without proof), ordered sets, Inequalities, Intervals, Absolute value, Cartesian product, Relation.

Unit II: Functions and Graphs  
6 hours
Constants and variables, Concept of functions, Domain and range of a function, Types of functions, Graphic representation (algebraic, logarithmic and exponential functions), Application of functions to business and economics.

Unit III: Derivatives  
9 hours
Limit of a function at a particular point and at infinity, Properties of limits (without proof) Continuity, Types discontinuity, Test of continuity and discontinuity for simple algebraic functions; Derivative, Average rate of change, Derivate as a slope of tangent to curves, Methods of differentiation (power rule, sum rule, product rule, quotient rule and chain rule), Differentiation of implicit and parametric functions, Higher order derivatives.

Unit IV: Applications of Derivatives  
6 hours
Increasing and decreasing functions, Derivative as a rate of change, Critical point, Point of inflection, Maximum and minimum of a function of one variable, Problems related to business and economics.
Unit V: Vectors
Introduction, Vector representation, Magnitude of a vector, Types of vectors, Vector addition and multiplication, Scalar product of two vectors, Vector product of two vectors, Collinear and coplanar vectors, Vector space, Linear dependence and independence vectors.

Unit VI: Matrices and Determinants
Introduction, Types of matrices, Matrix operations, Transpose of a matrix, Determinant of a matrix, Minors and cofactors of matrix, Properties of determinants, Singular and non-singular matrix, Adjoint and inverse of matrix, Solution of system of linear equations having unique solution up to three variables (Cramer’s rule, Inverse matrix method and Gaussian elimination method), linear transformations, rank of matrices.

Unit VII: Permutations and Combinations
Basic principles of counting, factorial notation, permutation, Permutation of objects alike, Permutation with restrictions, Circular permutation, Combination, Combination with restrictions.

Basic Text

References
Course Objectives
The objective of this course is to familiarize students with the basic psychological concepts and processes to understand human mind and behavior in relation to self and others. Specifically, it provides a basic understanding of psychological science of human nature. It familiarizes students on how biology, cognition and action influence the human behavior and personality of the individual. It helps to acquire the knowledge of different psychological processes and their effect on human cognition and behavior. Finally, it develops an understanding of how human behavior can be understood, shape, and applied in individual and group/social level.

Course Description
This course surveys the major concept, theories, and processes of basic psychology. It addresses the core psychological process as well as their importance on individual and social setting.

Course Outcomes
By the end of this course, students should be able to:
- know basic concepts of human psychology and the core processes related to psychology;
- have an idea of the major theories that explain human behavior and cognitive processes;
- use psychological knowledge to describe and explain human behavior in personal and social settings; and
- apply human psychology in understanding and explaining individual and social level of behavior.

Course Contents

Unit I: Introduction to Psychology as a science of Mind and Behavior  
5 hours
Nature, modern history, of Psychology, common sense and psychology, similarities and differences with other social sciences; Perspectives of psychology (Biological perspective, cognitive perspective, behavioral perspective, Psychodynamic and humanistic perspective, Socio-cultural perspective and evolutionary perspective); Scientific method and psychological research

Unit II: Biological Basis of Behavior  
5 hours
Importance of Biology in psychological understanding of behavior, Neurons, nervous system, structure and functions of central nervous system, Endocrine system and its importance.

Unit III: Sensation and Perception  
10 hours
Sensation: Meaning, importance, sensory threshold, habituation and adaptation; Types of sensory experiences, structure and functions of Visual and auditory sensation, Perception: definition and characteristics; Perceptual processes (Pathways in Brain and top-down and bottom-up processing), subliminal and extrasensory perception, Theoretical explanation of perceptual organization (Gestalt principles), Perceptual ambiguity and distortion. Social cognition and behavior: process of social cognition, attitude, social influence, prejudice and discrimination.
Unit IV: Learning and Memory 9 hours

Learning: Nature of learning (Behavioral vs. cognitive, instinct, and complex forms of learning) Classical condition learning and its application; Operant conditioning learning and behavior modification and shaping, Cognitive learning (cognitive map, insight and observational learning). Memory: Memory phenomenon and basic processes (encoding, storage and retrieval), Models of memory; Parallel Distributed Processing Model and Information Processing Model, Retrieval (cues, recall, recognition, reconstruction, and automatic encoding); Forgetting: nature and causes of forgetting, memory and the brain, amnesia and false memories.

Unit V: Cognition (Thinking and Intelligence) 7 hours

Thinking: Definition and nature, component of thought (mental images, concepts, prototypes) and reasoning, thought and brain; Problem solving and decision making (preparation, production and judgment): obstacles in problem solving thinking and decision making; Creativity; Intelligence: nature, types, and determinants of intelligence, Intelligence tests and concept of IQ; Individual differences in intelligence.

Unit VI: Motivation, Emotion and Stress 7 hours

Motivation: Nature and characteristics of motivation, Instinct, drive-reduction approach, arousal approach, incentive approach of motivation, cognitive approach to motivation; Physiological need and motivations (Hunger and sex), Socio-psychological motivation (need for achievement and power); Emotion: nature and types and functions of emotion; James-Lange, Cannon-Bard, and Schachter-Singer theories of emotion. Emotion and Health; Stress: stressor and the cost of stress, general adaptation syndrome model, psychoneuroimmunology of stress; Coping stress, style and learned helplessness, social support;

Unit VII: Personality 5 hours

Nature and determinants of personality, Theories of personality: Freud's theory; Trait theory (Allport and Cattel's theory); Big five personality traits, evaluation; Bandura's social cognitive theory, evaluation; Humanistic approach; Measurement of personality; Self-report; Projective tests, Behavioral assessment.

Basic Texts

1. Feldman, R. S. Understanding Psychology. New Delhi: Tata Mcgraw Hill.

References

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

Course Description
The first three units of this course examine the two fundamental microeconomic topics, viz. the introduction to microeconomics, consumer theory and producer theory. Then the course focuses on market competition with the introduction of monopoly, oligopolistic and monopolistic competition. The major concentrations of this course are: supply and demand, consumer demand theory; preferences and choice, rationality assumptions, and budgetary constraints, producer theory; production and costs functions, market structure: perfect competition, monopoly, monopolistic competition, and oligopoly and distribution theory.

Course Outcomes
By the end of this course, students should be able to:
- explain basic economic terminology (as e.g. opportunity costs, marginal utility, consumer’s equilibrium etc) in a comprehensive and intuitive way;
- describe and justify the main assumptions behind simple economic models as e.g. the demand and supply model, the perfect competition model, the monopoly model, etc;
- illustrate diagrammatically these models and perform policy experiments (e.g. introducing taxes);
- derive numerically economic instruments and learn how to use them in practice (e.g. price elasticity, optimum commodity purchase, profit maximization, Lerner’s index etc.);
and
- solve algebraically simple microeconomic models in order to determine the equilibrium economic variables, and reflect on the solutions with a critical mind.

Course Contents

Unit I: Introduction to Microeconomics 8 hours

Unit II: Theory of Consumer Behavior 12 hours

Unit III: Production and Cost 9 hours

Unit IV: Market Structures and Pricing 9 hours
Equilibrium of the Firm and Industry: Perfect Competition, Monopoly, Monopolistic Competition, Monopoly Power, Discriminating Monopoly, Aspects of Non-price Competition; Meaning of an Oligopolistic Behavior.

Unit V: Theory of Distribution 10 hours

Basic Texts

References
Course Objectives
The purpose of this course is to provide students with a broad and integrative introduction to the theories and practice of management. In particular, this course focuses on the major areas of the management process: planning, organizing, leadership and control from an organizational viewpoint. The course also attempts to enable students to understand the role, challenges, and opportunities of management in contributing to the successful operations and performance of organizations.

Course Description
This course presents a thorough and systematic coverage of management theory and practice, and focuses on the basic roles, skills and functions of management, with special attention to managerial responsibility for effective and efficient achievement of goals. Special attention is given to communication, motivation, leadership, team management, quality management, conflict management, and organizational change and development.

Course Outcomes
By the end of this course, students should be able to:
- understand fundamental concepts and principles of management, including the basic roles, skills, and functions of management;
- demonstrate knowledge about the historical development, theoretical aspects, and emerging trends and developments in management;
- conceptualize how internal and external environment shape organizations and their responses;
- analyze organizational goals, planning systems, organizational structures, staffing practices, and conflict management strategies of an organization;
- examine the interpersonal talents a manager must develop to be effective as a leader and change agent; and
- discuss various concepts and approaches to decision making, leadership, employee motivation, management control, work group behavior, and quality management.

Course Contents

Unit I: The Nature of Management 10 hours
*Introduction to Management:* Definition; Characteristics of management; Principles of management; Process and functions of management; Managerial hierarchy and levels; Managerial Skills and roles; Emerging issues and challenges for management.

*Management Theories:* The classical, behavioural, management science, systems, contingency, and contemporary perspectives on management.

*The Environmental Context of Management:* Concept; Organization-environment interface; Types and components of organizational environment; Emerging business environment in Nepal.
Unit II: Planning and Decision Making 7 hours
Organizational Goal Setting and Planning: Organizational goals – purpose and functions; The planning function – planning system, methods, types, and steps in the planning process; Concept of strategic planning - situational analysis; Tools to aid strategic planning.

Managerial Decision Making: Concept; The decision making process; Types and conditions of decision making; Group decision making; Techniques to aid decision making.

Unit III: Organizational Structure and Staffing 10 hours
Organizational Structure and Design: Principles, process, and approaches to organizing; Organizational design – major types; Departmentation; Authority, power and responsibility; Delegation and decentralization of authority; Informal organization; Emerging concepts in organizing and design.

Staffing: Concept, objectives, importance and components of staffing; Human resource management system.

Unit IV: Mobilizing Individuals and Groups 11 hours
Leadership: Concept and functions; Leadership versus management; Qualities of good leadership; Leadership traits and styles; Approaches to leadership.

Managing Work Teams: Concept, importance, types, and formation of work groups; Team management – concept, types and strategy for effective team management; Organizational conflicts – concept, types, and sources; Conflict management strategies and techniques.

Employee Motivation: Concept and types; Theories of Maslow and Herzberg; Techniques of employee motivation.

Interpersonal and Organizational Communications: Concept and purpose; Communication network and process; Communication flows; Types of communication; Barriers to effective communication; Enhancing organizational communication.

Unit V: Management Control System 5 hours
Control System: Concept, types and process; Features of effective control; Managing information for effective control; Techniques of control.

Quality Management: Concept and principles; Quality control – concept and methods; Total Quality Management – concept and techniques; Factors affecting control; Deming management; Emerging quality management issues and challenges.

Unit VI: Organizational Change and Development 5 hours
Organizational Change: Concept; Forces for change – internal and external; Need for planned change; Process of planned change; Resistance to change; Causes of resistance; Overcoming resistance to change; Implementing and monitoring the change process.

Organizational Development: Concept, objectives, key benefits, OD activities and process.
Basic Texts

References
CMP 161 Programming Language
BCIS, First Year, First Semester

Course Objective
This course provides students with a comprehensive study of the C programming language. Classroom lectures stress the strengths of C, which provide programmers with the means of writing efficient, maintainable, and portable code. The lectures are supplemented with non-trivial lab exercises.

Course Description
The overall objective of this course is to provide the students a sound understanding of the fundamentals of C and how to apply them effectively in the practical ground. The course provides step-by-step approach of how to apply these concepts solving real world problems.

Course Outcomes
By the end of this course, students should be able to:
- understand the importance of the software development process - from specification to design to implementation to testing to review;
- recognize the value of documentation at different stages of the software development process, including the production of a specification document, a design document, diagramming (such as flowcharts and Jackson Structured Programming), and a test plan and results;
- understand general principles of computer languages such as: loops (while/for), conditional branching (if/switch), block structures (including nesting and scope rules), functions (including parameter passing, prototypes and recursion), input/output (e.g. input from keyboard or a stored file, output to the screen or a stored file), arithmetic rules (e.g. precedence, operators, common functions);
- learn how these principles are implemented in the C programming language;
- develop problem-solving skills to translate 'English' described problems into programs written using the C language;
- understand how to use and manipulate variables and types to change the program state, including numeric, character, array and pointer types, as well as the use of structures and typedefs;
- understand the purpose of pointers for parameter passing, referencing and dereferencing, and linking data structures; and
- understand the purpose and use of function libraries.

Course Contents

Unit I: Historical Development  2 hours
History of computing and computers, Types of computers (analog and digital), Generations of computers.

Unit II: Introduction to Computer Systems  4 hours
Fundamental concepts of computer, Memory, hardware, software and firmware, Block diagram of digital computer, Computer peripherals.
Unit III: Programming Preliminaries
Introduction to program and programming language, Types of programming language, Generations of programming languages, Program design methodology, Software development: Stages of software development, Text editor; Assembler, Compiler, Interpreter, Algorithms, Flowcharts, Pseudo codes, ASCII.

Unit IV: Introduction to C
C Basics; variables and constants, The simple data types in C. Operators, Header files, Input and Output statement: Unformatted I/O, Formatted I/O, Type conversion, Loops and Decisions (For loop, while loop, Do while loop, Nested loop Case-break and continue statements, If Else, Else-If and Switch statements), Functions (Variables, Returning a value from a function, Sending a value to a function, Arguments, Preprocessor directives, C libraries, Macros, Header files and prototyping), Recursion.

Unit V: Arrays and Strings
Initializing arrays, Multidimensional arrays, String; functions related to the string.

Unit VI: Structures and Unions
Initializing structures, Nested type structure, Arrays and structures, Unions.

Unit VII: Pointers
Pointer data type, Pointers and Arrays, Pointers and Functions, Pointers and Structures.

Unit VIII: Files and File handling
Opening and creating a file in different modes (Read, Write and Append).

Basic Text

References
BCIS
First Year
Second Semester
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

References
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
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
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
Sequence, series Convergence Test of infinite Series, direct comparison test, limit comparison test, P-series test, De Almber't ratio test, Cauchy root test, Alternating series test, Interval and radius of convergence.

Unit IV: Fourier Series and Integrals
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
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**

**References**
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

Unit III: Theories of Employment
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
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
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

Basic Texts

References
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 experiments 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 multiplexers, 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 alphanumerical 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-Flops 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 12L, 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)
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
**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 identifiers, automatic documentation through comments, error exception handling).

**Prerequisite**
*This is the first course on Object-Oriented Programming using Java. Students are not expected to 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  
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  
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  
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  
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  
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  
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

References