

**EAST WEST UNIVERSITY**  
**DEPARTMENT OF CIVIL ENGINEERING**  
**Curriculum of Bachelor of Science (B. Sc.) in Civil Engineering (CE) Program: Courses**

**Course Descriptions**

**Compulsory General Education Courses: [Three Courses] 9 Credits**

**ENG 101: Basic English**

Credits: 3

Prerequisite: ENG099 (if required)

This course is designed students to provide the opportunity for understanding and improving all four skills in English with special emphasis on reading and writing. Lessons are balanced in this way: Grammar and vocabulary lessons to improve the students' accuracy in real-life settings; speaking and listening lessons to improve their confidence, fluency and presentation skills; and reading and critical thinking lessons to provide integrated language practice involving diverse topical issues. Overall, students' capacity to organize and present ideas in English is developed.

Textbooks:

- Interactions 1 (reading), 4<sup>th</sup> edition, McGraw-Hill Publications
- English Skills-John Langan, 7<sup>th</sup> edition, McGraw-Hill
- English Brush-up-John Langan, 7<sup>th</sup> edition, McGraw-Hill

**ENG 102: Composition and Communication Skills**

Credits: 3

Prerequisite: ENG101

In this composition course, students will study the principles of writing and analyzing non-fiction prose, focusing on argument and academic research strategies. As students, one should be able to write a literate and well-argued essay and should be able to read a literary text with some understanding and sensitivity. For practical purposes, this means that students should be able to write an effectively organized and substantial essay that is generally grammatically and syntactically sound, and acquire the capacity to identify and discuss prose features. In English 102, students will acquire and polish the tools fundamental to effective writing and reading that will help them participate successfully in the discourse systems of the university and beyond.

Textbook:

- College Writing Skills with Readings- Langan, J (2005).. New York: McGraw-Hill International Edition

**GEN 226: Emergence of Bangladesh**

Credits: 3

Prerequisite: ENG102

## **Optional General Education and Sociology Courses: [Two Courses] 6 Credits**

### **GEN 201: Bangladesh Studies**

Credits: 3

Prerequisite: ENG102

The objective of this course is to familiarize the students with the notion of our glorious struggle for the independence of Bangladesh as well as the thematic areas of national importance and public good. The course will be offered from an interdisciplinary perspective with the aim of covering a wide range of issues including the pre-colonial and colonial historical episodes leading to the emergence of the nation-state; geographic features, natural resources, and environmental aspects; education, society, and politico-cultural change, economic and social inequality, and urbanization; functioning of state focusing judicial, administrative, and legislative systems and governance; socio-economic development focusing on economic growth plans (rural and urban), poverty eradication, livelihoods, social transformation, social safety net, local governance, role of NGOs, civil society, and development agencies and partners.

Textbooks:

- The Discovery of Bangladesh-Dr. Akbar Ali Khan
- Bangladesh, Emergence of a Nation-A. M. A. Muhith
- Banglapedia
- Perspectives on the Environment of Bangladesh- A. M. Choudhury and FakhruAlam
- Sociology- Habibur Rahman
- Bangladesh: Anatomy of Change-Abdul AwalMintoo
- Bangladesh Politics:Problems and Issues-RounaqJahan
- Democracy and the Challenge of Development: A Study of Politics and Military Intervention in Bangladesh-Moudud Ahmed
- Public Admistrations in Three Decades-Syed Giasuddin Ahmed
- Government-NGO Interface in Development Management-Afroza Begum

### **GEN 204 : Western Thought**

Credits: 3

The aim of the course is to introduce students to some masterpieces of western literature. The course includes selections from William Shakespeare, Charles Dickens, Anthon Chekov, Guy de Mupassant, Robert Frost, T.S. Eliot.

### **GEN 205 : Introduction to Psychology**

Credits: 3

Prerequisite: ENG102

This introductory course on Psychology aims at familiarizing the students of other disciplines with the central concepts and theories of Psychology. It covers both the traditional areas of Psychology and applied topics, including the biological foundations of behavior, sensation, perception, learning, memory, abnormal behavior and treatment and health psychology. The course will not only provide the students with a conceptual overview of understanding human behavior and mental processes, but also a pathway to

self-understanding, offer the potentials of a future career, and will give them an opportunity for intellectual discovery.

Textbook:

- Understanding Psychology-Feldman, R. S.

### **GEN 207: Industrial Psychology**

Credits: 3

Prerequisite: ENG102

Industrial Psychology (I/O Psychology) is the applied field in which the principles of psychology are used to provide insights into how organizations function, and why they do, what they do. This course is based on the science of peoples' behavior at work and the application of psychological principles of organizational and work settings. The purpose of I/O Psychology is to show how it will directly influence ones lives as job applicants, trainees, employees, managers, coordinators, and consumers, in brief, the nature of work in modern society. It is going to make students familiar with Job Analysis, Performance Appraisal, Assessment Methods for Selection and Placement, Selecting Employees, Training and Development, Theories of Employee Motivation, Job Satisfaction and Organizational Commitment, Productive and Counter Productive Behavior, Working Conditions, Employee Health and Safety from behavioral perspective.

Textbooks:

- Industrial and Organizational Psychology-Spector P.E.
- Psychology and Work today-Schultz D. P. and Schultz S. E.

### **GEN 208: Introduction to Philosophy**

Credits: 3

This course is designed to familiarize students with some fundamental problems and issues in philosophy. As a course in a second or higher order discipline concerned with critical thinking, this can help us improve our ways of making sense of the world. This will provide an opportunity for cultivating the skills of evaluating arguments and developing the habits of cooperative rather than adversarial argumentation for problem solving and effective deliberation. The topics to be discussed include: Definition, Nature and Scope of Philosophy; Thinking as the way we make sense of the world; Problem Solving as Thinking Critically; Theories of Reality; Knowledge; Values; Theories of Truth; Proofs for the existence of God; Problem of Freedom of Will; Mind-Body Relation; Existentialism, Pragmatism and Logical Positivism as philosophical trends.

Textbooks:

- An Outline of Philosophy- Dr. AbdulMatin
- An Introduction to Philosophical Analysis-John Hospers
- Living Issues in Philosophy-H. Titus

**GEN 210 : International Relations**

Credits: 3

Prerequisite: ENG102

The study of International Relations attempts to analyze world events and speculate future in a systemic way. The basic objective of this course is to understand the world that is fast changing. Towards this end, this course intends to equip the students with knowledge and analytical tools necessary to comprehend, evaluate, and respond to an increasingly complex array of problems both at the national and international levels. The course focuses on such key areas as Theories of International Relations, Concept of Power, War and Peace, Diplomacy, United Nations, Regional Organizations, Nuclear Arms Race, Inter-State Conflict and Cooperation, International Terrorism and Counter Terrorism, Third World Poverty, International Development, and Globalization.

Textbooks:

- Global Politics- Andrew Haywood, Palgrave Macmillan, 2014
- International Relations Theory: The Essentials- Oliver Daddow, Sage Publications, 2013
- An introduction to international Relations- Richard Devetak, Anthony burke and Jim George, Cambridge University Press, 2012
- Perspectives on International Relations: Power, Institution, Ideas- Henry R. Nau, CQ Press, 2012
- International Politics: Power and Purpose in Global Affairs- Paul D'Anieri, Wadsworth, 2010
- Issues in 21<sup>st</sup> Century World Politics- Mark Beeson and Nick Bisley (eds.), Palgrave Macmillan, 2011
- Principles of International Politics- Bruce Bueno de Mesquita, CQ Press, 2010

**GEN 211: Concepts of Journalism and Media Studies**

Credits: 3

Prerequisite: ENG102

The broad objective of the course is to examine the basic tenets of newspaper journalism on one hand and media studies on the other. Journalism: the specific objective of the course in Journalism is to show how research, organize and write stories; understand the internal structures of newspapers; advertising, circulation and readership and editorial policies of the newspapers; different political systems in which media exists, newspaper censorship and laws of libel as well as ethical issues. Media Studies: The students will be introduced to the various forms of media including print and electronic such as newspaper, radio and television; conceptual learning about operating system of different form of media especially the applications of information technology in TV; news script writing for print and TV media.

Textbook:

- Understanding Journalism – Burns, S.L, Sage Publications, 2002

**GEN 223: Contemporary Security Studies in Asia-Pacific**

Credit: 3

Prerequisite: ENG102, GEN210

This course focuses on contemporary socio-economic and politico-military security issues in the context of Asia-Pacific region. The course will make an attempt to introduce key elements of global and regional security-nuclear security threats, rise of strategic powers and forms and dimensions of security in relation

to national and international politics. The course also explores future perception of threats and preventive mechanisms to develop confidence building among the actors. It will address both theoretical and applied knowledge of security discourse in the context of global politics. The objective of the course is to examine the rationale of the security studies and to consider the implications of traditional security in the context of international relations and politics.

### **GEN 225: Demography and Economic Statistics**

Credit: 3

The course is designed to introduce students to basic concepts of demographic measurement and modeling used to study changes in population size and composition. The course covers basic measures of mortality, fertility and migration; life table construction; multiple decrement life tables; stable populations; population projections; and age patterns of vital events. Students will learn to apply demographic methods through a series of weekly problem sets.

This course covers basic descriptive statistical techniques used in analyzing data in the perspective of social science. Statistics is the science of collecting, organizing, summarizing, and analyzing information in order to draw conclusions. Statistics is a discipline that plays a major role in many different areas. For example, it is used in sports to help a sports team make informed decisions about their competition. It is used to predict the outcome of elections and to help determine government policies. Statistics assists in determining the effectiveness of new medications. It is used by agronomists to find higher yielding varieties of crops. Animal scientists use statistics to find new feeding regimes for animals. Statistics plays a major role in economics in testing hypotheses about economic relations. Statistical models are used by economists to predict economic output, interest rates, stock and commodity prices, and many other economic variables. The above applications will be highlighted in this course.

Textbook:

- Essential of Demographic Analysis of Africa-G. M. K. Kpedekpo

### **GEN 239: Professional Ethics**

Credits: 3

Pre-requisite: ENG102

This course is designed to introduce ethical and spiritual commitment in the profession in order to maintain higher standard at work environment. More specifically, the course will focus on moral character, character development, moral leadership, developing morality in organization, moral behavior, characteristics of moral standards, moral issues and ethical principles, moral obligations, spirituality, natural laws-the concept of a moral being, duties and rights, applying natural laws, moral decision-making process-steps in the decision making process, making ethical decisions, decision strategies, personal morality, codes of professional conduct-purpose of a code of conduct, critical elements in the development of a code of professional conduct, rules of professional conduct, professional standards.

Textbooks:

- Professional Ethics & Human Value- R. S. Naagarazan
- Professional Engineering & Geoscience: Practice and Ethics- Gordon C. Andrews
- Business Ethics: Concepts and Cases- Manuel G. Velasquez
- Engineering Ethics- M. Govindarajan

## **SOC 101: Introduction to Sociology**

Credits: 3

**Introduction:** Definition of Sociology. Nature and scope of Sociology. Origin and development of Sociology. Relationships with other Social Sciences. The emergence of Sociology and Fourfold origin of Sociology

**Basic Concepts of Sociology:** Group, Association, Institution, Community, Norms and Values, Role and Status, Folkways and Mores, Society and Organization

**Culture:** Definition. Elements of culture (norms, values, symbols, language). Material and Non- Material Culture. Cultural Lag, Cultural Evolution. Diversity and integration. Counter Culture, Cultural Relativism, Ethnocentrism, Cultural Integration).

Sub-culture. Basic elements of Bangladesh Culture, Cultural Traits and Complex.

**Social Structure:** Definitions of Social Structure. Levels of social structure (Micro and Macro). Components of social structure. Theories of Social Structure. Patterns of social relationships (exchange, Cooperation, Conflict, Competition, Domination and Subordination). Impact of structure upon individual.

**Socialization:** Definition. Nature and nurture. Dynamics of socialization. Socialization and early life cycle (Mead, Piaget, Erikson). Agents of socialization.

**Social Groups and Social Interaction:** Definition. Types of groups. Group dynamics. Functions of groups. Definition; Agencies of Social Control

**Social Control:** Definition of Social Control; Agencies of Social Control; Deviance and Crime. Explanation of deviance. Normal and Deviant careers.

**Social Stratification:** Definition. Types and theories of Stratification (Conflict, functional and other theories).

**Social Institutions:** Family; Functions of Family. Definitions of Family. Types of Family. State, Nature of State, Political Parties, Social Institutions, Economic Institutions; Education and Cultural Institutions.

**Social Change and Technology:** Definition. Perspectives of change. Sources of Change. Modernization. Theories of Social Change, Evolution, Progress and Development.

Textbooks:

- Sociology- A. Giddens, 5<sup>th</sup> edition, Polity Press, 2006
- Sociology- R.T. Scafer, 10<sup>th</sup> edition, McGrawhill Companies Inc., 2007

## **SOC 102: Introduction to Anthropology**

Credits: 3

**The Anthropological Approach:** Anthropology as a Field of Knowledge. Modes of Anthropological Understanding: Theory, Interpretation and Science. Different branches of Anthropology.

**An Evolutionary Perspective:** Human Evolution: The hominid lineage, The primate behavioral lineage, Language, and symbols. The Growth of Culture: Pre-historians as anthropologists, Paleolithic peoples, Food-producing, Urbanism and the Rise of states.

**Culture, Society, and the Individual:** Theories of Culture: Evolutionism, Diffusionism, Parallelism, Culture and people: Some basic concepts, The Anthropological concept of culture, The relation of culture to society. Language and Communication: the nature and organization of language, and from language to culture. Culture and the individual: culture and personality, and beyond cultural determinism.

**Marriage, Family and Kinship:** Marriage, Types of marriage, Why is Marriage Universal? Restrictions on Marriage: The Universal Incest Taboo, Childhood Familiarity Theory, Freud's Psychoanalytic

Theory, Family-Disruption Theory, Cooperation Theory, Inbreeding Theory, Form of Marriage. The Family,

Variation in Family Form. Kinship and the Structure of Kinship and Kinship Terminology

**Religion and Magic:** Origin of Religion, Elements of Religion. The Universality of Religion, Variation in Religious Beliefs and Practices, Functions of Religion, Theories of Religion, Magical Practices and Its influence on Society, Rituals and Rites. Religion and Adaptation, Religious Changes and Revitalization Change.

**Tribal Peoples:** Toward a Systematic View: The Tribal World as Mosaic, as Ladder, and as System. Modes of subsistence. Modes of adaptation: Contemporary hunter-gatherers, tropical horticulturalists, and pastoral adaptations. How cultures change: cultural ecology-cultural materialism.

**The Tribal World:** Economic systems: systems of production, the economics of distribution, and the integration of economic systems. Social structure: kinship in tribal societies, descent systems, kinship and social relations, marriage, family, and community. Marriage in comparative perspective: marriage contracts and transactions, incest, exogamy and alliance. Power and politics: the processes of politics, worlds of women, and worlds of men. Structures of inequality: law and social control, religion, ritual, myth, and cosmos. The integration of societies. The structure of cultures. Ethnic minorities and the notion of tribe in colonial politics.

**Anthropology and the Present:** Response to cataclysm: the tribal world and the expansion of the west, the peasants, and the creation of the third world. Cities: anthropology of cities, anthropology in cities. Social science and the postcolonial world. Decolonizing anthropology and toward Human Survival.

Textbooks:

- Anthropology The exploration of human Diversity-Kottak C. P. , 7<sup>th</sup> ed., McGraw-Hill
- Anthropology Haviland A. W., 4<sup>th</sup> ed., Harcourt College Publication

## **SOC 202: Social Psychology**

Credits: 3

Prerequisite: ENG102

**Introduction:** Definition. Nature and scope of Social Psychology. Origin and development of Social Psychology as a scientific discipline. Relation of Social Psychology with other social and biological sciences.

**Schools of Psychology:** Development of schools of modern social psychology. Methods of Social Psychology. Psychology of cognition.

**Sensation and Perception:** Types. Theories of Sensation and Perception, Stages of perception, Social and Cultural Determinants of Perception. Significance of stimulus and response. Meaning and various types of instincts. Development of self socialization of individual.

**Social Interaction:** Theories of social interaction. Group dynamics, Process of leadership, Types of Leadership, Types of group. Group solidarity. Morale and cohesiveness. Group leadership.

**Motivation:** Biogenic and Sociogenic motivation. Motivational Cycles.

**Behavior:** Instinctive Behavior vs. learned behavior, Learning, Definition of Learning, Theories of Learning (Thorndike, Pavlov, Skinner), Socialization and its agencies.

**Mass Behavior:** Crowd; Audience; Mob; Fashion; Fad.

**Collective Behavior:** Public Opinion, Process, Factors and Agencies of Public Opinion, Propaganda, Rumor.

**Attitude:** Attitude Formation and Attitude Change, Scales to measure attitude (Thurstone Scale, Bogardus Scale, Likert Scale).

**Personality:** Theories of personality (Kardiner, Linton, Mead, Benedict, Adler, Harney and Freud). Personality and culture (Horn, Linton, Mead, Kardiner). Personality and class. Personality measurement.

### **SOC 209: Industrial Sociology**

Credits: 3

**Introduction:** Nature and scope of Industrial Sociology. Foundation of Industrial Sociology. Relationship with rural and urban sociology. Approaches of Industrial Sociology.

**Industrialization:** The pre-industrial and industrial revolution. Industrializing and industrial society. Structural and functional dimension of industrial society. Pre-conditions and major barriers of industrialization. Industrialization of Bangladesh.

**The Social Structure of Industrial Society:** Role differentiation and distribution. Internationalization of **New Values:** rational work, discipline, and industrial bureaucracy. Industrial Management.

**Problems of Industrial Society:** Forces of stability and strains. Industrial conflict. Marginality and Individualization. Alienation and Anomie. Problems of employment and unemployment.

**Social Organization of Industry:** Industrial organization. Bureaucracy. Management and human relations. Hawthorne study. Industrial interest group. Organizational behavior.

**Industrial Relations:** Trends, issues and theories of industrial relations. Industrial conflict. Trade unionism. Collective bargaining. Psychological approach. Marxist approach of industrial relations.

**Social Security:** Health and medical care in industry. Problems of housing. Education and rehabilitation.

**Industrialization in Bangladesh:** Causes, trends, and problems of industrialization. Comparison with developing and developed countries.

Textbooks:

- Industrial Financing through Capital Market in Bangladesh: A study on the demand side- M. Farid Ahmed, The Asia Foundation & the Bureau of Economic Research, 1993
- Modern Industrial Organization- W. Carlton Dennis & Jeffery M. Perloff, 4<sup>th</sup> edition, Addison Wesley, 2004
- Industrial Sociology- Delbert C. Miller & W.H. Form, 3<sup>rd</sup> edition, Harper & Row, 1980
- Industrial Organization: competition, growth & structural change- Kenneth D. George, 4<sup>th</sup> edition, Routledge, 1991 (2000 printing)
- Industrial Revolution in the Eighteenth Century- Paul Mantoux, University Paperbacks, 1961
- Industrial Sociology- Delbert C. Miller & Form, 3<sup>rd</sup> edition, Harper & Row, 1980
- The Coming of Post- Industrial Society- George Ritzer, 2<sup>nd</sup> edition, McGrawhill, 2007
- Sociology, Work & Industry- Tony Watson, 2<sup>nd</sup> edition, Routledge, 1987

### **SOC 211: Eastern Culture and Heritage**

Credits: 3

The objective of this course is to introduce the culture and civilization of eastern part of the world. The specific goal is to make the students familiar with different religions, culture and heritage, and intellectual tradition of this region. Major topics include: a brief study of the life of early man; an analytical view about cultural settings of our present and ancient civilizations; various features of Eastern epistemology; an elaborate discussion about various features of culture and heritage of our subcontinent especially in



Bangladesh; cultural contact between the East and the West; and contributions of some major scholars of Eastern tradition.

### **SOC 212: Social Ecology, Environment and Society**

Credits: 3

The objective of this course is to help students learn basic environmental problems and ecological principles, develop their ability to use these principles to interpret ecological problems and understand the repercussions of environmental mismanagement. Topics include: Environment science, input reduction, population bomb, resources, ecology and population, abundance control, community diversity, energy flow, type of species, demography, resource management, biodiversity, pollution, controlling pollution, water pollution, air pollution, ethics.

Textbooks:

- Living in the Environment: Principles, Connections & Solutions-G.T. Miller, 11<sup>th</sup> edition, Pacific Grove Publications, 2000
- Human Dependence on Nature- How to Solve the Environmental Crisis- H. Washington, Routledge, 2013
- The Environment- A Sociological Introduction- W. P. Sutton, Polity Press, 2007

### **SOC 213: Women in Development**

Credits: 3

Prerequisite: ENG101

The course focuses on conceptual overview and practical tools for understanding the role of women in development process. It discusses the interrelationship between various development issues and gender. The course helps students to become aware of gender issues in both theoretical and Bangladesh contexts. It also attempts to help students to contribute to the efforts to eliminate all forms of gender discrimination in Bangladesh society. The course examines the role of women in economic development. Students are expected to gather knowledge and skill to develop a career plan in the perspective of gender. The course includes feminist analysis of international relations and development theories and Women Development Policy and Programme in Bangladesh. Topics include: Sex and Gender, Society; Patriarchy; Men-Women relationship in the patriarchal society, Theories of WID, WAD and GAD, Gender role, division of labour and gender needs. Women's reproductive health and right, Adolescence health care in relation to gender, Health and nutritional and HIV/AIDS issues in relation with gender, Gender and poverty, Gender and environment, Violence against women, One stop crisis centre visit/ Visit to a village, Case preparation, CEDAW and its clauses, Constitutional and fundamental rights of women, Beijing platform for action(PFA), Anti-dowry laws, and labour laws.

Textbooks:

- Gender and Development-Momsen, Janet H. (New York: Routledge, 2004)
- From WID to GID: Conceptual Shifts in the Women and Development Discourse-Razavi, Shahrashoub
- Why Women Counts?-Hamid Shamim
- Understanding Gender-BhasinKamla
- Women's Role in Economic Development-Boserap Easter

- Gender and Command Over Property: A Critical Gap in Economic Analysis and Policy in South Asia-ArgawalBina
- Rethinking Rural Poverty: Bangladesh as a case Study
- Women and Politics Worldwide-Nelson barbar J., Chowdhury Nazma
- Demanding Accountability: The Global Campaign and Vienna tribunal for Women’s Human Rights-Bunch C., Reilly N
- Constitution of Bangladesh and selected countries
- National Women Development Policy, 2011, Bangladesh

### **SOC 214: Introduction to Development Studies**

Credits: 3

Prerequisite: ENG 102

The course provides an introductory look at the theories and concepts, which form the foundation of development. The student throughout the course will be facilitated to critically assess contemporary development issues such as poverty, gender discrimination and lack of access to natural resources. Key theoretical concepts such as modernization, liberalism, development projects and human rights will be addressed along with the usefulness of social research.

Textbooks:

- Theories and Practices of Development-Katie Wiilis
- Poverty and Development: Into the 21<sup>st</sup> century-Tim Allan and Alan Thomas

### **SOC 215: Principles of Social and Public Relations**

Credits: 3

Prerequisite: ENG 102

The primary objective of this course is to familiarize students with the basic concepts and principles of public relations. At the end of the course, students should have attained knowledge and understanding of the role and functions of public relations in an industrialized society, the basic tools, process and theories of public relations which include research, planning, communication, evaluation and the use of dynamic communication strategies to achieve organizational goals. This course also strives for a better understanding of public relations activities, impression management and how public relations works during crisis situations in personal and organizational arena.

Textbooks;

- The Practice of Public Relations – Saitel Fraser P., Charles E. Merrill Publishing Co., 1984
- The Dartnell Public Relations Handbook – Dilenschneider Robert L., Dan J. Forrestal, The Dartnell Corporation
- Advertising, 4<sup>th</sup> edition, Write and Warner
- Nature of Public Relations- Marston, John E., McGrawHill

**SOC 216: Globalization and Social Identity**

Credits: 3

Prerequisite: ENG 102

This course has been designed to provide a comprehensive understanding of basic principles of globalization and social identity from an analytical perspective. The course will aid the students to make analytical conclusions regarding key social issues such as migration, governance, terrorism, globalization and international trade. From a developing nation perspective the course will also shed light on the debate between the Asian and Western Value systems, and thus provide a comprehensive view of people's perceptions of the globalizing world.

**SOC 217: Religion, Ethnicity, Culture and Development in South Asia**

Credit: 3

Prerequisite: ENG102, GEN206

The socio-cultural and political existence of South Asian countries is often challenged by religious and cultural intolerance in recent times, although they are theoretically multi-ethnic and multi-religious countries. As a result, the socio-cultural and philosophical foundation of ethnic minorities is often neglected in the political processes in the name of democracy and economic development. In other words, the cultural identity of the ethnic and religious minorities is controlled through the politics of social exclusion and isolation. In many cases, the notion of social exclusion and isolation between the majority and minority has even spread into the thinking of the rural people of these countries. The policy of social exclusion has been used mostly to maintain and control the politics within the countries of South Asia.

This course will examine how the democratic processes uphold or fail to uphold cultural diversity within the socio-cultural and political conditions of these countries. It will also explore how religious and cultural identities and the social and philosophical foundations of the ethnic communities are addressed in the political processes in South Asia. More specifically, this course will critically examine the issues of social inclusion and exclusion, the socio-political and historical contexts and the ethical and development practices of diverse ethnic communities and development.

**Optional Business and Economics Courses: [Two Courses] 6 Credits****ACT 101: Financial Accounting**

Credits: 3

This course aims to disseminate accounting and reporting fundamentals to the beginners. Upon the completion of the course, the participants are expected to be expert in drafting financial statements independently with the style of reading financial statements and the regulatory (national and international) requirements. The course includes the chapters titled introduction, users and branches of accounting, conceptual framework of accounting, generally accepted accounting principle, institutional framework, financial statements, accounting cycle, measuring and recording business transaction, concept of adjusting and closing entries, worksheet, accounting for merchandising operations, accounting information systems, internal control and cash, accounting for receivables, and inventories, plant assets - natural resources and intangible assets and accounting for depreciation.

Textbook:

- Accounting Principles-Jerry J. Weygandt, Donald E. Keiso, Paul D. Kimmel, 7<sup>th</sup> edition, John Wiley& Sons, Inc.

### **BUS 321: Business for Engineering and Technology**

Credits: 3

Prerequisite: ENG102

This course should be taught with emphasis on engineering technological dimensions and practical examples drawn from engineering organizations and practices. Topics to be covered: Business Environment (Types of Business, Entrepreneurship skills, the external environment of business, SWOT and PEST Analysis, Steps in setting up a new business). General Management (Managerial Roles and Organization Structure, Typical Structure of a manufacturing organization, Managerial tools for Decision making, Leadership, Motivation models, Strategic planning). Operational Management (Product and Services, product design and process selection, Faculty location and layout, Operational planning and scheduling, quality management, inventory and material management, productivity measurement and improvement). Financial Management (Basic accounting and financial concepts, Introduction to Financial Statement, Financial Statement Analysis).

### **FIN 101: Principles of Finance**

Credits: 3

Prerequisites: ACT 101, STA 102, ECO 101

This course is designed to provide the basic concepts, principles, analytical methods and tools that are used in basic financial management. The course includes the following topics- the study of financial environment including financial markets, instruments and institutions, risk and return, valuation of financial assets, introduction to capital budgeting and financial statement analysis.

Textbook:

- Principles of Marketing- Philip Kotler and Gary Armstrong, 15<sup>th</sup> edition, Pearson Education, Inc. 2013.

### **FIN 201: Business Finance**

Credits: 3

Prerequisites: FIN 101

This course has been designed to develop understanding of both theoretical and practical issues of financial decision making tools for the students. After completing this course, students are expected to be able to make many financial decisions both at strategic and operation level related to cost of capital, analyzing company's current financial policies and redesign a more effective financial planning and controlling mechanism through ratio analysis, short-term liability management, management of working capital, managing the very basics of operation process like management of inventory, management of receivables, designing credit policy that improves the market share and cash flow, usability of financial and operating leverage to multiply the return to the shareholders.

Textbook:

- Essentials of Managerial Finance-Scott Besley and Eugene F. Brigham, 14<sup>th</sup> ed.

### **FIN 335: Financial Institutions and Markets**

Credits: 3

Prerequisites: ECO 102, FIN 201

Financial Markets facilitate the flow of funds in order to finance the investment by individual, corporations and Governments. Financial Institutions are the key players in Financial Markets. Hence an understanding of money markets, capital markets: equity market and bond market, financial instruments traded in these markets, valuation and risks of these instruments, determination of interest rates, term structure of interest rates, primary market and stock offering, secondary market and market microstructure, mutual funds operations, pension funds operations, discussions of major financial institutions and the understanding of the Financial Markets and Institutions in Bangladesh with its regulatory environment are the major focus of this course.

Textbook:

- Financial Markets & Institutions- Jeff Madura

### **MGT 101: Principles of Management**

Credits: 3

Prerequisites: ENG101

Meaning and importance of management, evaluation of management thought, managerial decision making, environmental impact on management, corporate social responsibly, planning setting objectives, implementing plans, organizing, organization design, managing change, human resource management-directing, motivating, leading managing workgroups, controlling- controlled principles, processes and problems, managing in a changing environment.

Textbook:

- Management: Principles and Applications-Ricky W. Griffin

### **MGT 321: Industrial Management**

Credits: 3

Pre-requisite: ENG102

This course should be taught with emphasis on engineering and technological dimensions and practical examples drawn from engineering organizations and practices. Topics to be covered: Business Environment (Types of Business, Entrepreneurship skills, the external environment of business, SWOT and PEST Analysis, Steps in setting up a new business). General Management (Managerial Roles and Skills, Five Basic Functions of Management, Organization Structure, Typical structure of a manufacturing organization, Managerial tools for Decision Making, Leadership, Motivation models, Strategic Planning). Operations Management (Product and Services, Product design and process selection, Facility location and layout, Operation planning and scheduling, quality management, inventory and

material management, productivity measurement and improvement). Financial Management (Basic accounting and financial concepts, Introduction to Financial Statements, Financial statement analysis).

Textbook:

- Business for the 21<sup>st</sup> century-Skinner and Ivencevich

### **MGT 337: Production Operations Management**

Credits: 3

Prerequisites: STA 102, MGT 101

This course is designed to provide the students with an understanding of the foundation of the operations function in both manufacturing and service. The course provides a general introduction and frameworks to manage manufacturing and service operations efficiently. Topics include Introduction to Operation Management, Operation strategy, Forecasting Models, Material Requirement Planning (MRP), Production Scheduling, Facility Location and Layout Planning, Decision Analysis, PERT/CPM Analysis, Gant Chart, Supply Chain Management.

Textbook:

- Operations Management-Jay Heizer, Barry Render, j. Rajashekhar, 9<sup>th</sup> ed.

### **MKT 101: Principles of Marketing**

Credits: 3

This course is designed to introduce fundamental marketing concepts, theories and analytical tools critical to manage profitable customer relationships in today's highly competitive and complex business environment. It provides an overview of all the marketing activities involved in the provision of products to final and organizational consumers. A diverse range of marketing topics is covered in this course including marketing strategy and planning, the marketing environment and how to monitor it, consumer and organizational behavior, marketing research, market segmentation and development of target markets, new product development, pricing, distribution, promotion and international marketing.

Textbook:

- Principles of Marketing-Philip Kotler and Gary Armstrong, 15<sup>th</sup> ed., Pearson Education, 2013

### **MKT 201: Marketing Management**

Credits: 3

Prerequisite: MKT 101

This course aims at developing a solid understanding of the basic terminology, concepts, tools, and frameworks in marketing. A broad range of marketing issues in a variety of consumer, industrial, and service environments is covered. Topics include consumer buying behavior, market segmentation, product positioning, marketing mix, sales force management, and market research techniques.

Textbook:

- Marketing Management- Philip Kotler and Kevin L. Keller, 15<sup>th</sup> ed., Pearson Education, 2011

### **ECO 101: Principles of Microeconomics**

Credits: 3

Introduction to Economic theory. The concept of scarcity and choice; production possibility frontier; economic systems. theory of demand and supply. Importance of market price. Consumer behavior: Theory of utility. Production: theories related to production; costs of production. Market Structure: Perfect Competition and Monopoly, and an introduction to monopolistic competition and oligopoly markets. Factor market: introduction to the labor market, Rent theory.

Textbooks:

- Principles of Microeconomics-Parkin, Michael
- Economics- Paul A. Samuelson & William D. Nordhaus, 8<sup>th</sup> edition, McGraw-Hill

### **ECO 102: Introduction to Macroeconomics**

Credits: 3

Prerequisite: ECO 101

Macroeconomic is the policy oriented part of economics. The course will deal with the concepts and measurement of national income, inflation, unemployment, with an attempt to reveal how macro-economic variables such as national income, unemployment, inflation can be manipulated by government policies. The course will also introduce the macro-economic models using a graphical.

Approach: consumption function, investment theory, equilibrium and disequilibrium models of macro economy - classical and Keynesian theory. The focus of the discussion in the course will be on acquainting students with the macroeconomic fundamentals of an economy.

Textbook:

- Principles of Macroeconomics- N.G. Mankiw, The Dryden Press

### **ECO 200: Agricultural Economics**

Credits: 3

Prerequisite: ECO 101

Introduction of agriculture as an industry; economics of agricultural production, farm management, land economics, rural organization, agricultural credit and finance, agricultural law, agricultural marketing, agrarian reform, agricultural policy, agricultural prices, structure and scope of Bangladesh agricultural sector.

Textbooks:

- Introduction to Agricultural Economic Analysis- C. E. Bishop and W. D. Toussaint, John Wiley and Sons Inc.
- Agricultural Economics Growth-Milton M. Snodgrass and Luther T. Wallace, Meredith Corporation, New York.
- Agricultural Economics-H. Evan Drummond and John W. Goodwin.

**ECO 260: Environmental and Natural Resource Economics**

Credits: 3

Prerequisite: ECO 101

This course aims at exploring and examining human relationship with environment with special emphasis on Bangladesh. The course surveys the economic, cultural, social, and political aspects of human population dynamics, food resources and hunger, mineral and energy resources, air, land and water pollution, wilderness and wildlife resources, urban and rural land usage, and toxic waste management from environmental and conservation viewpoints. The course makes recommendations and probes possible solutions to contemporary resource and environmental problems of Bangladesh. Current issues important to the environment are stressed in class projects.

Textbook:

- Environmental and Natural Resource Economics-Tietenberg, Tom, Pearson Education, 6<sup>th</sup> edition.

**ECO 357: Mathematical Economics**

Credits: 3

Economic models and equilibrium analysis, linear models and matrix algebra, differentiation and comparative statics, comparative statics of general function models, optimization and equilibrium, exponential and logarithmic functions, multi variable optimization, optimization with equality constraints, economic dynamics and integral calculus.

Textbook:

- Mathematics for Economics- Michael Hoy, J Livernois, C McKenna, R Rees and ThanasisStengos; The MIT Press 2<sup>nd</sup> edition

**Basic Science Courses: [Three Courses] 12 Credits****PHY 107: Engineering Physics I (Introductory Classical Physics)**

Credits: 3+1.5

Prerequisite: None

**Mechanics:** Review on Particle Dynamics; Conservation of Energy; Conservation of Linear Momentum; Collisions; Rotational Dynamics; Conservation of Angular Momentum; Equilibrium of Rigid Bodies. Fluid Mechanics: Concept of Fluids; Pressure and Density; Measurement of Pressure; General Concept of Fluid Flow; the Equation of Continuity; Bernoulli's Equation; Applications; Fields of Fluid-Flow.

**Waves in Elastic Media:** Different types of Waves; Mechanical Waves; The Superposition Principle; Wave Speed; Power and Intensity in Wave Motion; Interference of Waves; Complex Waves; Standing Waves and Resonance.

**Thermal Physics:** Review of Temperature and Heat; Isothermal and Adiabatic Changes; Reversible and Irreversible processes; the three laws of Thermodynamics and the concept of Entropy; Carnot Cycle; Carnot Theorem.

**Wave Optics:** Light as electromagnetic wave; interference of light; Michelson interferometer, Newton's ring; Fresnel and Fraunhofer diffractions, diffraction by single and double slits, diffraction gratings and its



resolving power; polarization of light, different types of polarization, Nicol's prism, and optically active materials.

The course includes lab work based on theory taught.

Textbook:

- Fundamentals of Physics, Halliday, Resnick & Walker, Wiley.

Reference Book:

- University Physics, Sears, Zemansky and Young, Addison Wesley Publishing Company.

### **PHY 209: Engineering Physics II (Introductory Quantum Physics)**

Credits: 3

**Modern Physics:** Photoelectric effect, quantum theory of light, X-rays and X-ray diffraction, Compton effect; de Broglie waves, phase velocity and group velocity, particle diffraction; Concept of operators, Schrödinger equation, Harmonic oscillator, and other one-dimensional systems - infinite quantum well, potential step and potential barrier; quantum box.

**Formal Theory of Quantum Mechanics:** Kets, Bras, and Operators; Matrix Formulation; Hilbert Space; Measurements, Observables, and the Uncertainty Relations; Position, Momentum, and Translation; Wave Functions in Position and Momentum Space; Time Evolution and the Schrödinger Equation; The Schrödinger Picture, Heisenberg Picture and Interaction Picture; Operator theory of Simple Harmonic Oscillator.

Textbook:

- Quantum Physics: A Beginner's Guide, Alastair I. M. Rae, Oneworld Publications.

Reference Book:

- Introduction to Quantum Mechanics, David J. Griffiths, Benjamin Cummings.

### **CHE 107: Engineering Chemistry - I**

Credits: 3+1.5

**Atomic Properties and Binding Forces:** Atoms, molecules and forces between them, Forces in solids and bindings, Ionic bond, Covalent bond, Metallic bond, Hydrogen bond and Vander Wall's force; properties of gases.

**Oxidation and Reduction:** Oxidation and reduction, Oxidation number, Analytic reagents.

**Acid and Bases:** Strong and weak acids and bases, pH, Buffer solutions, Neutralization curves, Indicators for acid-base titrations.

**Chemical Equilibrium & Thermodynamics:** Chemical equilibrium; concepts of chemical thermodynamics and thermochemistry; electrolysis, Galvanic cells, electrodes and electrode reactions, reduction potential, the chemical series, standard hydrogen electrode, Measurement of pH.

**Chemical Solutions:** Different types of solutions and their colligative properties. Selective Organic Compounds: Aliphatic and aromatic organic compounds with their derivatives.

**Basics of Biochemistry:** Amino acids, Peptides and proteins, Hemoglobin as an allosteric model, Enzymes, Cofactors, Bioenergetics, Membrane transport, Metabolism of proteins, Carbohydrates, Lipids, Nucleic acids.

The course includes lab work based on theory taught.

Textbooks:

- Chemistry: Ed. By Steven S. Zumdahl and Susan A. Zumdahl, Houghton Mifflin Company, Boston, New York.
- Chemistry: Chang.
- Organic Chemistry: T.W.G. Solomons, John Wiley & Sons, New York.

### **Mathematics and Statistics Courses: [Four Courses] 12 Credits**

#### **MAT 101: Differential and Integral Calculus**

Credits: 3

Differential Calculus: Limit, Continuity and differentiability. Successive differentiation of various types of functions. Leibnitz's theorem. Rolle's theorem. Mean value theorems. Taylor's and Maclaurin's theorems in finite and infinite forms. Lagrange's form of remainders. Cauchy's form of remainders. Expansion of functions. Evaluation of indeterminate forms by L'Hospital rule. Partial differentiation. Euler's theorem. Tangent and normal. Concavity of functions. Determination of maximum and minimum values of functions and points of inflection with Applications. Curvature, Asymptotes.

Integral Calculus: Integration by the method of substitution. Standard integrals. Integration by successive reduction. Definite integrals, its properties and use in summing series. Walli's formulae. Improper integrals. Beta function and Gamma function. Area under a plane curve and area of a region enclosed by two curves in Cartesian and polar co-ordinates. Volumes of solids of revolution. Volume of hollow solids of revolution by shell method. Area of surface of revolution. Jacobians. Multiple integrals with applications.

Textbook:

- Calculus; Howard Anton, Irl Bivens, Stephen Devis, John Wiley & Sons.

Reference Book:

- Calculus and Analysis; M.R. Spiegel, Schaum's outline series.

#### **MAT 102: Differential Equations and Special Functions**

Credits: 3

Pre-requisites: MAT101.

**Ordinary Differential Equations:** Degree and order of ordinary differential equations. Formation of differential equations. Solutions of first order differential equations; Separable & homogeneous equations, Exact equation. Integrating factor. Equations made exact by integrating factors. First order linear equation. Bernoulli's equation. Higher order linear homogeneous equation with constant coefficients. Initial and Boundary value problems. Linear non-homogeneous equation with constant coefficients: Method of undetermined coefficients, Method of variation of parameters, Operator method; Series solution; Frobenius method.

**Partial Differential Equations:** Formation of PDEs & First order linear PDEs. Solution of PDEs of first order; Lagrange's Method. Second Order homogeneous & non-homogeneous PDEs with constant coefficients. Wave equations. Particular solutions with boundary and initial conditions.

**Special Functions:** Legendre differential equation and Legendre polynomials, Recurrence relations for Legendre polynomials, Spherical harmonics, Bessel differential equation, Bessel functions, Recurrence

relations for Bessel functions, Modified Bessel functions, Hermite differential equation, Hermite polynomials, Hyper-geometric function.

Textbook:

- Schaum's Theory and Problems of Differential Equations (Outline Series), Frank Ayres, Schaum Publishing.

Reference Book:

- Differential Equations, George F. Simmons, McGraw-Hill.

### **MAT 104: Co-ordinate Geometry and Vector Analysis**

Credits: 3

Pre-requisites: MAT101

**Two-Dimensional Geometry:** Change of axes, transformation of co-ordinates, Pair of straight lines, Circles: Tangents and Normals, Chord of Contact, System of Circles: Orthogonal Circles. Conic Section: Parabola, Ellipse & Hyperbola. The general equation of second degree, Identification of Conics.

**Three-Dimensional Geometry:** Co-ordinate systems; Direction cosines & direction ratios, Plane, Straight line: The Shortest distance, Sphere: Tangent Plane. Cylinder and Cone.

**Vector Analysis:** Vectors and Scalars, Algebra of vectors, Vector differentiation and vector integration, Gradient, Divergence and Curl: Cartesian, Spherical, Polar and cylindrical systems, Physical significance of Gradient, Divergence and Curl. Green's theorem, Divergence theorem, Stoke's theorem and their applications.

Textbook:

- Vector Analysis (Schaum's series), Murray R. Spiegel, Schaum Outline Series.

Reference Book:

- Coordinate Geometry, Luther Pfahler Eisenhart, Dover Publications Inc.

### **STA 102: Statistics and Probability**

Credits: 3

**Introduction:** Nature and scope, nature of statistical data, Attributes and variables, Discrete and continuous variables, Methods of data collection, Tabulation, graphs and diagrams; Measure of location: characteristics of an ideal measure, Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Quartiles, Deciles, Percentiles; Measure of dispersion: Absolute measure, Relative measure, Range, Standard deviation, Mean deviation, Quartile deviation, Co-efficient of dispersion, Co-efficient of variation, Skewness and kurtosis; Regression and correlation: relation between variables, Fitting of regression lines, Simple correlation, multiple correlation and regression; Theory of probability; Theorems of total, compound and conditional probability, Random variables Bayes theorem, Discrete and continuous random variables, Probability function, Expectation of sum and products, Concept of Binomial, Poisson and Normal distribution, Random process, Auto correlation function of a random process, multiple random process, Basic concepts of discrete and continuous probability distributions, Markov process, Queuing process; Sampling techniques; Test of significance: Test of means, Variance, Correlation coefficients and regression coefficients.

Textbook:

- Probability & Statistics for Engineering and the Sciences, J.L. Devore, Prentice Hall.

Reference Book:

- Applied Statistics & Probability for Engineers, D.C. Montgomery and G.C. Runger, John Wiley and Sons.

## **Core Civil Engineering Courses**

### **Basic Civil Engineering: [Eleven Courses] 33 Credits**

#### **CE100 Civil Engineering Drawing**

Credits: 0+1.5

Lines and lettering; plane geometry: drawing of linear and curved geometric figures, e.g. pentagon, hexagon, octagon, ellipse, parabola, hyperbola; solid geometry: concept of isometric view and oblique view, theory of projections; drawing of isometric view of 3D objects such as cube, prism, pyramid, cone and cylinder; projections of cube, prism, cone, cylinder; developments of cube, pyramid, cone, cylinder; plan, elevations and sections of one storied buildings and bridges.

Text Books:

- Civil Engineering Drawing by - Gurcharan Singh & Subash Chandra
- Prathomic Engineering Drawing by - Hamonto Kumar Bhattacharjo
- Engineering Drawing by Basant Agrawal and C M Agrawal

#### **CE101 Analytic Mechanics**

Credits: 3

Coplanar and non-coplanar force systems; moments; analyses of two-dimensional frames and trusses; friction; flexible chords; centroids of lines, areas and volumes; moments of inertia of areas and masses; plane motion; liner momentum and impulse; angular momentum and impulse; internal forces and friction; introduction to space frames.

Text Books:

- Title: Analytic Mechanics –Third edition. Author: Virgil Moring Faires & Sherman Daniel Chambers.
- Engineering Mechanics: by William F. Riley, Leroy D. Sturges.
- Analytic Mechanics by – Faires & Chambers (3rd Edition)
- Engineering Mechanics by – Singer
- Engineering Mechanics: Statics, 13th Ed., Hibbeler
- Engineering Mechanics: Dynamics, 13th Ed., Hibbeler
- Fundamentals of Physics:, 9th Ed., Halliday, Resnick and Walker.

#### **CE102 Computer Aided Drafting**

Credits: 0+1.5

Introduction to computer usage; introduction to CAD packages and computer aided drafting: drawing editing and dimensioning of simple objects; plan, elevations and sections of multi-storied buildings; reinforcement details of beams, slabs, stairs etc; plan and section of septic tank; detailed drawings of roof trusses; plans, elevations and sections of culverts, bridges and other hydraulic structures; drawings of building services.

Text Books:

- Engineering Drawing by M.B. Shah & B.C. Rana

- Engineering drawing: with an introduction to AutoCAD by Dhananjay A Jolhe
- Fundamentals of engineering drawing by Cecil Jensen & Jay D. Hesel
- Fundamentals of AutoCAD by Steven B. Combs & Jay H. Zirbel.

### **CE103 Surveying and Introduction to GIS**

Credits: 3+1.5

History of surveying, introduction to surveying, orientation with survey equipments and instruments, reconnaissance survey/project survey, linear measurements, traverse survey, triangulation, levelling, contouring, calculation of area and volumes, house setting, problems of heights and distances, curve and curve ranging, transition curves, super-elevation and vertical curves, tachometry: introduction, principles and problems of tachometry, some basic concepts & definition of spherical trigonometry of astronomical survey, map: definition, types, scale & measurements of map, map & map projections, standardization of projection, acoustic measurements and investigations; hydrographic operations.

GIS: some basic concepts, location & spatial data, GIS data source (vector & raster data), use of GIS and application of GIS, features of arc GIS, natural resource management by GIS, GIS in flood management, GIS in project management, GIS in urban planning and other civil engineering aspects.

Introduction to remote sensing, use and application of remote sensing, features of ERDAS imagine, introduction to photogrammetric survey, features of virtual globe map and geographical information program, GPS: an overview, application of GPS.

Text Books:

#### ***Theory***

- Surveying Volume 1, 2, 3 – Dr. B.C. Punmia
- Surveying – M.A Aziz
- Surveying & Leveling (Part-1) – S.V. Kulkarni & T.P. Kanitkar
- Surveying- Volume I, II, III by- Dr. B.C. Punmia (SI Units)
- A Text book of Surveying by- M.A. Aziz & Shahjahan
- Schaum's Outline of Introductory Surveying by Roy Wirshing and James Wirshing
- Construction Surveying and Layout: A Step-By-Step Field Engineering Methods by Wesley G. Crawford
- Basic Surveying (4th edition) by Raymond Paul and Walter Whyte
- Concepts and Techniques of Geographic Information System by – C.P. Lo Albert and K.W. Yeung
- Principles of Geographical Information System by – Peter A. Burrough and Rachel A. McDonnell.
- Geographical Information System and Computer Cartography by - Christopher Jones
- ArcGIS 9.3.1 Tutorial by – Wilpen L. Gorr, Kristen S. Kurland.

#### ***Practical Surveying***

- Surveying- Volume I, II, III by- Dr. B.C. Punmia (SI Units)
- A Text book of Surveying by- M.A. Aziz & Shahjahan
- Schaum's Outline of Introductory Surveying by Roy Wirshing and James Wirshing
- Construction Surveying and Layout: A Step-By-Step Field Engineering Methods by Wesley G. Crawford
- Basic Surveying (4th edition) by Raymond Paul and Walter Whyte

## **CE200: Details of Construction**

Credits: 0+1.5

Types of building, components of a building, design loads, framed structure and load bearing wall structure; foundations: shallow and deep foundation, site exploration, bearing capacity of soil, standard penetration test; brick masonry: types of brick, bonds in brickwork, supervision of brickwork, defects and strength on brick masonry, typical structures in brickwork, load bearing and non-load bearing walls, cavity walls, partition walls; lintels and arches: different types of lintels and arches, loading on lintels, construction of arches; stairs: different types of stairs, floors: ground floors and upper floors; roofs and roof coverings; shoring; underpinning; scaffolding and formwork; plastering, pointing, painting; distempering and white washing; cement concrete construction; sound insulation: acoustics; thermal insulation; house plumbing: water supply and wastewater drainage; thunder arrestor.

Text Books:

- Concrete and Formwork by T W Love
- Building Construction by W.B. McKay (V. 1)
- BDA Guide to Successful Brickwork by the Brick Development Association.
- Concrete Construction, by Ken Nolan
- Building Construction by – Sushil Kumar
- Formwork for Concrete by M.K. Hurd, Fifth Edition.
- New Scaffolding Guidance TG20:08 – Guide to Good Practice for Scaffolding with Tube and Fittings NASC (National Access and Scaffolding Confederation), UK
- Plumbing a House: For Pros by Pros by Peter Hemp
- Building Construction by – Dr. B.C. Punmia
- Building Construction Engineering by – Gurcharan Singh
- Construction Drawings and Details for Interiors: Basic Skills, 2nd Edition by Rosemary Kilmer and W. Otie Kilmer
- Sound Insulation by Carl Hopkins
- Popular Mechanics Complete Home How-to by Albert Jackson, David Day
- PWD manual on house construction and plumbing

## **CE201: Engineering Materials**

Credits: 3+1.5

Properties and uses of aggregates, brick, cement; sand, lime, mortars; concrete; concrete mix design; admixtures; wood structures and properties; shrinkage and seasoning; treatment and durability; mechanical properties; wood products; basic property of FRP composites and available FRP composite products; steel; aluminum; introduction to geo-textiles; definition of stress and strain; plane stress and strain condition; identification of strain components of elastic, elasto–plastic and elasto-visco-plastic materials; time dependent strain response of these materials due to different types of loadings; mathematical and simple rheological modeling for prediction of creep behavior; ferro-cement: advantages and uses; corrosion and prevention of steel in RC structures; offshore structures; material for ground improvement; application of nano technology in cement and concrete; introduction to high performance material (ie., green building materials, ECC etc).

Text Books:

### ***Theory***

- Building Materials by – Gurcharan Singh
- Engineering Materials by - M.A. Aziz
- A Text book of Engineering Materials by – G.J. Kulkarni (6th Edition)

- Engineering Materials Technology: Structures, Processing, Properties, and Selection (5th Edition) by James A. Jacobs and Thomas Kilduff.

***Sessional***

- Building Materials by – Gurcharan Singh
- Engineering Materials by - M.A. Aziz
- Laboratory manual

**CE203 Engineering Geology and Geomorphology**

Credits: 3

Minerals; identification of minerals, common rock forming minerals; physical properties of minerals; mineraloids rocks; types of rocks, cycle of rock change; earthquake and seismic map of Bangladesh. Structural geology; faults; types of faults; fold and fold type; domes; basins; erosional process; quantitative analysis of erosional land forms. Channel development; channel widening; valley shape; stream terraces; alluvial flood plains; deltas and alluvial fans; channel morphology; channel patterns and the river basin; geology and geomorphology of Bangladesh.

Text Books:

- A Geology for Engineers by – F.G.H. Blyth (Low priced text book)
- A Geology for Engineers by – Blyth & Freitas (7th Edition)
- Physical Geology by – Leet, L Don, Judson, Sheldon (2nd Edition)
- Principles of Geomorphology by – William D. Thornbury (2nd Edition)

**CE211 Mechanics of Solids-I**

Credits: 3+1.5

Prerequisite: CE101

Concepts of stress and strain, constitutive relationships; deformations due to tension, compression and temperature change; beam statics: reactions, axial force, shear force and bending moments; axial force, shear force and bending moment diagrams using method of section and summation approach; elastic analysis of circular shafts, solid non-circular and thin walled tubular members subjected to torsion; flexural and shear stresses in beams; shear centre; thin walled pressure vessels.

Text Books:

***Theory***

- Engineering Mechanics of Solids by - Popov
- Theory and Problems of Strength of Materials by -William A Nash
- Strength of Materials by – Andrew Pytel, Ferdinand L. Singer (4th Edition)

***Sessional***

- Engineering Mechanics of Solids by – Popov
- Theory and Problems of Strength of Materials by -William A Nash
- Laboratory Manual by Bear and Johnson

**CE213 Mechanics of Solids-II**

Credits: 3

Prerequisite: CE211

Symmetric and unsymmetric bending of beams; stress transformation, failure criteria; beam deflection by direct integration and moment area method; buckling of columns; elastic strain energy and external work; cable and cable supported structures; bolted, riveted and welded joints.

Text Books:

- Engineering Mechanics of Solids by – Popov
- Advanced Strength and Applied Elasticity, 5th Edition, by A C Ugural and S K Fenster
- Theory and Problems of Strength of Materials by -William A Nash
- Strength of Materials by – Andrew Pytel, Ferdinand L. Singer (4th Edition)
- Mechanics of Materials by – Laurson & Cox
- Strength of Materials by – R.S. Khurmi

### **CE261 Fluid Mechanics**

Credits: 3+1.5

Fluid properties; fluid statics; kinematics of fluid flows; fluid flow concepts and basic equations-continuity equation, Bernoulli's equation, energy equation, momentum equation and forces in fluid flow; steady incompressible flow in pressure conduits, laminar and turbulent flow, general equation for fluid friction; empirical equations for pipe flow; minor losses in pipe flow; pipe flow problems-pipes in series and parallel, branching pipes, pipe networks.

Text Books:

#### ***Theory***

- Fundamentals of Fluid Mechanics by Munson, Young, Okiishi, Huebsch, Sixth Edition, Publisher: Wiley, ISBN-978-0470-26284-9
- Engineering Fluid Mechanics, by Crowe, Elger Williams, and Roberson, Ninth Edition, Publisher: Wiley, ISBN 978-0-470-25977-1
- Fluid Mechanics with Engineering Applications, Franzini and Finnemore, most recent edition, Publisher: McGraw Hills, ISBN-13: 978-0072432022
- Fluid Mechanics with Engineering Application by – Franzini
- Fluid Mechanics by – Streeter & Wylie
- Fluid Mechanics by – Frank M.White.

#### ***Sessional***

- Fluid Mechanics with Engineering Application by – Franzini
- Fluid Mechanics by – Streeter & Wylie
- Laboratory Manual.

### **CE408 Quantity Surveying and Cost Analysis**

Credits: 0+1.5

Earthwork excavation for roadway, earthwork computation from spot levels; estimation for residential building: estimation of slab, beam, column, footing; analysis of rates, specifications, costing of residential building; estimation and costing of septic tank; estimation and costing of underground water reservoir; estimation and costing of retaining wall; estimation and costing of slab culvert; estimation and costing of bridges; highways construction; estimation of steel truss; computer aided quantity estimation; construction site survey and estimation.

Text Books:

- Following texts will be used as reference books and students are encouraged to buy at least two of them as professional reference books.



- Building Construction – by: Sushil Kumar
- How to Build a Nice Home – by: Engr. Md. Ibrahim.
- Estimating – Abul Faraz Khan
- Estimating Costing and Valuation – by: S.C. Rangwala.
- Estimating by – Abul Faraz Khan.
- Quantity Surveying: A Practical Guide for the Contractor's QS by Donald Towey.

### **Civil Engineering Practice: [Two Courses] 7.5 Credits**

#### **CE301 Professional Practices and Communication**

Credits: 3+1.5

Project: characteristic feature, types and life cycle; type of contracts and estimates; procurement regulations and law; documents for procurement of works, goods, services and their application; tender procedure with the light of PPR; claims, disputes and arbitration procedure.

Communication: concepts, methods and strategies for effective speaking and inter-personal communication; business and engineering reports, proposals and messages; conducting meetings; an introduction to the code of ethics for engineers; introduction to MOI (Method of Instruction).

Text Books:

#### ***Theory***

- Project Management - Planning and Control by – Albert Lester.
- The Process of Management by – William H. Newman.
- Project Management by S Choudhury
- Business correspondence and Report Writing- A practical approach to business and technical communication by R C Sharma and Krisna Mohan
- PPR 2008, Bangladesh.
- DPP preparation guide book published by planning commission

#### ***Sessional***

- Business correspondence and Report Writing- A practical approach to business and technical communication by R C Sharma and Krisna Mohan.
- Project Management - Planning and control by Albert Lester
- PPR 2008, Bangladesh.
- DPP preparation guide book published by planning commission

#### **CE401 Project Planning and Construction Management**

Credits: 3

Project planning and evaluation; feasibility reports; cash flows, payback period, internal rate of return; benefit-cost ratio; cost-benefit analysis case studies; Planning and scheduling, PERT, CPM; resource scheduling; linear programming and application. Principles of management; construction management: principles, project organization, methods and practices, technology, management of materials and equipments, site management, contracts and specifications, inspection and quality control, safety, economy.

Conflict management; psychology in administration: human factors in management; human resource management. Demand forecasting; inventory control; stores management; procurement; legal issues in construction; environmental regulations. Construction safety.

Text Books:

- Project Planning and Control by -Lester
- The Process of Management by – William H. Newman

- Introduction to Operational Research by – Hiller & Liberman.
- Project Management Techniques by – A.O. Awani
- Construction Planning, Equipment and Methods by – Peurifoy
- Material Management & Inventory Control by – A.K. Datta
- Project Management by – S. Chowdhury.

### **Structural Engineering: [Five Courses] 16.5 Credits**

#### **CE311 Structural Analysis and Design-I**

Credits: 3

Prerequisite: CE213

Stability and determinacy of structures; analysis of statically determinate trusses and arches; influence lines; moving loads on beams, frames and trusses; analysis of suspension bridge.

Wind and earthquake loads; approximate analysis of statically indeterminate structures: braced trusses, portal method, cantilever method and vertical load analysis of multi storied building frames; deflection of beams, trusses and frames by energy method (strain energy, principles of virtual work, Castigliano's theorem).

Text Books:

- Theory of Simple Structures by – T.C. Shedd and J.Vawter (2nd Edition)
- Elementary Structural Analysis by – Utku, Norris & Wilber (4th Edition)
- Advanced Strength and Applied Elasticity, 5th Edition, by A C Ugural and S K Fenster
- Structural Analysis by Aslam Kassimali (3rd Edition)

#### **CE315 Design of Concrete Structures-I**

Credits: 3+1.5

Fundamental behavior of reinforced concrete; introduction to strength design and alternate design methods; flexural design of beams (singly reinforced, doubly reinforced, T-beam) using strength design method; shear, diagonal tension and torsion of beams; bond and anchorage; design of one way slabs; design of two-way edge supported slabs: using strip and alternate methods.

Text Books:

##### ***Theory***

- Reinforced Concrete: Mechanics and Design (6th Ed) by James Wight and James MacGregor
- Design of Concrete Structures by – Nilson (12th Edition)
- Design of Concrete Structures by – Nilson, David & Dolan (14th Edition).

##### ***Sessional***

- Design of Concrete Structures by Nilson (10th, 12th and 14th Edition)
- Bangladesh National Building Code (BNBC) - 2012
- AASHTO LRFD Bridge: Design Specifications 2012.

#### **CE319 Design of Steel Structures**

Credits: 3+1.5

Behavioral principles and design of structural steel; design of tension members, bolted and welded connections; compression members; residual stress, local buckling, effective length; flexural members; lateral torsional buckling; design of beam-columns; connection design, moment connections, column bases; detailing of steel structures, introduction to steel-concrete composite structures, advantages of composite construction.

Text Books:

**Theory**

- Steel Structures: Design and Behavior by Salmon, Johnson and Malhas (5th Edi)
- Design of Steel Structures by – Gaylord, Gaylord
- Limit States Design in Structural Steel by G L Kulak and G Y Grondin
- AISC Manuals for Steel Constructions (13th Edition-2005)

**Sessional**

- Steel Structures: Design and Behavior by Salmon, Johnson and Malhas (5th Edi)
- Limit States Design in Structural Steel by G L Kulak and G Y Grondin
- AASHTO LRFD Bridge: Design Specifications 2012

**CE410 Concrete Structures Design Sessional**

Credits: 0+1.5

Analysis the behavior of pre-stress (pre-tension and post-tension) beams through experiment; analysis and design of multistoried RCC residential building and pre-stress concrete (PC) girder bridge (hand calculation with finite element software).

Text Books:

- Design of Concrete Structures by – Winter & Nilson (10th Edition)
- Design of Concrete Structures by – Nilson (12th and 14th Edition)
- AASHTO LRFD Bridge: Design Specifications 2012
- Bangladesh National Building Code (BNBC)-2012.

**CE411 Structural Analysis and Design-II**

Credits: 3

Prerequisite: CE311

Analysis of statically indeterminate beams and frames by moment distribution, consistent deformation/flexibility and stiffness methods; algorithms for implementing direct stiffness method using computer; influence lines of statically indeterminate beams and frames.

Text Books:

- Elementary Structural Analysis by – Utku, Norris & Wilber (4th Edition)
- Matrix Methods of Structural Analysis by C K Wang
- Structural Analysis by Aslam Kassimali (3rd Edition).
- Bangladesh National Building Code (BNBC)-2012

**Environmental Engineering: [Two Courses] 7.5 Credits**

**CE331 Environmental Engineering-I**

Credits: 3+1.5

Introduction to Environmental Engineering: water, health and sanitation, ecology and environment; climate change; biodiversity; contemporary environmental issues. Water Supply Engineering: Water requirement in urban (water demand, population prediction, water demand for street fire hydrant and interior fire protection) and rural communities; the hydrologic cycle and water availability; water supply sources; ground water exploration: aquifer properties and ground water flow, well hydraulics, water well design, drilling, construction and maintenance; shallow hand tubewells, deep tubewells, deep set pumps, pond sand filter, rain water harvesting system and alternative water supplies for problem areas. Surface water collection and transportation; pumps and pumping machineries; water distribution systems; analysis

and design of distribution network; fire hydrants; water meters; water loss control (auditing, unaccounted for water, leak detection and water conservation). Water quality requirements; water treatment: plain sedimentation, coagulation, flocculation, filtration, disinfection; miscellaneous treatment methods; low cost treatment methods (arsenic/iron removal plants etc.) for rural communities; water safety plans

Text Books:

**Theory**

- A Textbook of Water Supply Engineering by – M.A. Aziz
- Environmental Engineering by – Peavy, Rowe & Tchobanoglous
- Water Supply and Sanitation by – Ahmed and Rahman.

**Sessional**

- A Textbook of Water Supply Engineering by – M.A. Aziz
- Water Supply and Sanitation by – Ahmed and Rahman
- Laboratory Manual

**CE333 Environmental Engineering-II**

Credits: 3

Wastewater Engineering: introduction; estimation of wastewater; wastewater collection systems; hydraulics of sewer; design, construction and maintenance of sanitary sewer and storm drainage system; sewer appurtenances; plumbing system. Microbiology of wastewater; wastewater characteristics; wastewater treatment and disposal; treatment and disposal of industrial effluents; sludge treatment and disposal; economical sanitation technologies / system for urban and rural communities (conventional system, pit latrine, pour-flush latrine, small bore sewerage system, septic tank system and ecological sanitation). Sustainability of water and sanitation services; participatory development approach in water and sanitation sector; community management of water and sanitation services. Introduction to solid and hazardous waste management; environmental impact assessment: risk analysis in environmental assessment; socioeconomic impact assessment; introduction to environmental pollution (water pollution, air pollution, noise pollution). Introduction to food sanitation. Introduction of EIA.

Text Books:

- Environmental Engineering by – Peavy, Rowe & Tchobanoglous
- Water Supply and Sanitation by – Ahmed and Rahman
- Wastewater Engineering by – Metcalf & Eddy (4th Edition)
- Water supply & Sewerage by – McGhee

**Geotechnical Engineering: [Two Courses] 7.5 Credits**

**CE341 Principles of Soil Mechanics**

Credits: 3+1.5

Prerequisite: CE203

Introduction to geotechnical engineering; formation, type and identification of soils; soil composition; soil structure and fabric; index properties of soils; weight volume relationship; engineering classification of soils; soil compaction; principles of total and effective stresses; permeability and seepage; stress-strain-strength characteristics of soils; compressibility and settlement behavior of soils; lateral earth pressure; stress distribution.

Text Books:

**Theory**

- An Introduction to Geotechnical Engineering (2nd Edition) by Robert D. Holtz and William D. Kovacs
- Text book of Geotechnical Engineering (2011) by Braja M. Das

- Geotechnical Engineering - A Practical Problem Solving Approach (2010) by N. Sivakugan and Braja M. Das
- Craigs Soil Mechanics by R.F.Craig, R.F.Pink
- Engineering soil mechanics” by Jan J. Tuma, M. Abdel-Hady
- Elements of Soil Mechanics by Geoffrey Nesbitt Smith
- Introduction to Soil Mechanics by Braja M. Das.
- Principles of Geotechnical Engineering, 8th Edition (2013), by Braja M. Das, Khaled Sobhan.
- Foundation engineering by – Peck, Hanson, Thornburn.

### ***Sessional***

- Introduction to Soil Mechanics by – Braja M. Das
- Foundation engineering by – Peck, Hanson, Thornburn
- Soil Testing for Engineers by – Lambe

### **CE441 Foundation Engineering**

Credits: 3

Soil investigation techniques; types of foundations; bearing capacity of shallow and deep foundations; settlement and distortion of foundations; design and construction of footings, rafts and piles; slope stability analyses.

Text Books:

- Foundation Analysis and design by – Joseph E. Bowles
- Foundation Design by Wayne C. Teng
- Foundation engineering by – Peck, Hanson, Thornburn
- Principles Foundation Engineering by – B.M. Das
- Theory And Practice of Foundation Engineering by – Sam
- Geotechnical Engineering - A Practical Problem Solving Approach (2010) by N. Sivakugan and Braja M. Das
- Geotechnical Engineering- Soil Mechanics by John N. Cernica
- Smith's Elements of Soil Mechanics by Ian Smith.
- Bangladesh National Building Code (BNBC)'93.

### **Transportation Engineering: [Two Courses] 7.5 Credits**

#### **CE451 Transportation Engineering-I: Transportation Planning and Traffic Engineering**

Credits: 3

Transportation engineering, transportation functions; transportation systems, functional components, factors in transportation development, transportation modes, public transportation, emerging modes; intelligent transportation system: components and applications; transport planning: concepts, scope and hierarchy, process, goals and objectives, inventories, socio-economic activities, land use-transport interaction, travel demand forecasting, traffic impact assessment; road safety and accident analysis. Geometric design of highways: design controls and criteria, cross sectional elements, alignment, sight distance, intersection and interchange layouts, planning and design of bicycle and pedestrian facilities; traffic engineering: fundamentals of traffic engineering, vehicle and traffic characteristics, traffic control devices and systems, introduction to signal optimization tools, traffic studies, planning and design of

parking facilities, roadway lighting; transportation in Bangladesh: transportation modes and networks, constraints and challenges, transport demand and modal share, road classification and design standards.

Text Books:

- Highway Engineering by – Paul H. Wright (6th Edition)
- Transportation Engineering and Transport Planning by – L.R. Kadiyali
- Transportation Planning and Traffic Engineering by – O’Flaherty

**CE453    Transportation Engineering-II:  
Pavement Design and Railway Engineering**

Credits: 3+1.5

Pavement materials: bituminous binders, cement, aggregates, embankment material, soil stabilization; mix design methods; low cost roads; flexible and rigid pavement: pavement components and functions, pavement design and construction, road maintenance; Rail traffic management and signalling; transportation demand, supply and equilibrium; road traffic assignment, network equilibrium, system optimality; traffic flow theory, shockwaves, deterministic and stochastic queuing analysis.

Text Books:

***Theory***

- Highway Engineering by – Paul H. Wright (6th Edition)
- Transportation Engineering and Transport Planning by – L.R. Kadiyali
- Principles of Pavement design by – E.J. Yoder
- Railway Engineering by – Rangwal
- Railway Engineering by – Agarwal (Student Edition)

***Sessional***

- Highway Engineering by – Paul H. Wright (6th Edition)
- Laboratory Manual

**Water Resources Engineering: [Two Courses] 7.5 Credits**

**CE461    Open Channel Flow**

Credits: 3+1.5

Open channel flow and its classification; velocity and pressure distributions; energy equation, specific energy and transition problems; critical flow and control; concept of uniform flow, Chezy and Manning equations, estimation of resistance coefficients and computation of uniform flow; momentum equation and specific momentum; hydraulic jump theory and analysis of gradually varied flow; computation of flow profiles; design of channels.

Text Books:

***Theory***

- Open Channel Hydraulics by – Chow
- Open Channel Hydraulics by – French
- Flow Through Open channels by – Rang Raju
- Flow in Open channel by – Subramanya

***Sessional***

- Open Channel Hydraulics by – Chow

- Laboratory Manual

### **CE463 Hydrology, Irrigation and Flood Control**

Credits: 3

Hydrologic cycle; Weather and hydrology; Precipitation, Evaporation and transpiration; Infiltration; Stream flow; Application of telemetry and remote sensing in hydrologic data acquisition; Rainfall-runoff relations; Hydrographs, unit hydrographs; Hydrologic routing; Statistical methods in hydrology. Plant-soil-water relationship; consumptive use and estimation of irrigation water requirements; canal layout in irrigation; methods of irrigation; quality of irrigation water; problems of irrigated land.

Text Books:

- Applied hydrology by Chow, Maidment and Mays
- Engineering Hydrology by K Subramanya (2nd ed)
- Hydrology and Hydraulic Systems by Ram S Gupta (2nd ed)
- Handbook of Hydrology by Maidment (1st ed)

### **Inter-Disciplinary Engineering Courses: [Two Courses] 7.5 Credits**

#### **CSE227 Numerical Methods and Computer Programming**

Credits: 3+1.5

Introduction to Numerical Methods: root finding using bisection, Regular-Falsi, Newton-Raphson's, Secant and Jacobi Methods. Error Analysis. Solutions of simultaneous linear equations using Gauss-Jordan elimination method. Interpolation: Lagrange's polynomials, Newton's polynomials and Splines. Least square curve fitting. Numerical Integrations: Trapezoidal rules, Simpson's rule, Romberg integration and quadratures. Finite Difference: forward, backward and central differences and Richardson's extrapolation. Solutions of ordinary and partial difference equations using finite difference technique. Solution of eigenvalue equation.

Introduction to Computer. Algorithm development and flow-chart construction for problem solving using computer. Information representation within computer: binary number system, binary arithmetic, binary codes. Structured Programming Concept: data types, variables, constants, operators, expressions, assignments, type conversions in assignments, formatted input/output, decision making and branching, decision making and looping, arrays, character string, functions, program structures, recursions, pointers pointer to function, advanced data types, user defined data types, advanced operators, records, file management, dynamic variables, linked lists. Programming for scientific and engineering problem solving.

Text Books:

#### ***Theory***

- Numerical Methods for Engineers – Steven C. Chapra & Raymond P. Canale
- Numerical Analysis – Dr. B.C. Goel & Dr. S.K. Mittal
- Introductory Methods of Numerical Analysis – S.S. Sastry
- Numerical Mathematical Analysis by – James b. Scarborough
- Introductory Methods of Numerical Analysis by – S.S. Sastry
- Numerical Methods For Scientific And Engineering Computation by- Jain, Iyengar, Jain
- Numerical Methods using Matlab (4th Edi.) by John H Mathews and Kurtis K Fink

- Fundamentals of Engineering Numerical Analysis by Parviz Moin (2010)

### ***Sessional***

- Teach Yourself C by – Herbert Schildt
- Programming With C by – Schaum's Outline Series.

### **EEE165 Basic Electrical Technology**

Credits: 3

Electrical units and standards; Electrical networks and circuit solutions: Series, parallel, node and mesh current analysis; Measurement of electrical quantities: current, voltage, resistance. AC circuit analysis: Instantaneous current, voltage and power, effective current and voltage, average power. Introduction to energy conversion. Introduction to electrical wiring for residential and commercial loads. Stand by generator and substation design considerations.

Text Books:

- Fundamentals of Electric Circuits – C. K. Alexander and M. N. O. Sadiku, Tata McGraw-Hill Publishing Company Limited, New Delhi.
- A Text Book of Electrical Technology- B L Theraja and A K Theraja; S.Chand & Company Ltd.
- The Lineman's and Cableman's Field Manual – T. M. Shoemaker, J. E. Mack, McGrawHills.
- Electrical Wiring Estimating and Costing – S. L. Uppal, Khanna Publishers.

### **Elective Civil Engineering Courses: 7-11 Credits**

*[Four to Six Courses: One to Two Theoretical Courses from the Major Group + One Compulsory Sessional Course from the Major Group + One to Two Theoretical Courses from the Minor Group + One Compulsory Sessional Course from the Minor Group]*

### **Structural Engineering**

#### **Theoretical Courses**

### **CE413 Introduction to Steel-Concrete Composite Structures**

Credits: 2

Introduction to steel-concrete composite structures; advantages of composite construction; interaction between steel and concrete, shear connectors, elastic analysis of composite beams, beam-column connections, behavior of different types of composite columns, axial load capacity and interaction diagrams for composite columns

Text Books:

- Steel Structures: Design and Behavior by Salmon, Johnson and Malhas (5th Edi)
- Limit States Design in Structural Steel by G L Kulak and G Y Grondin
- AISC design guide

### **CE415 Prestressed Concrete**

Credits: 2

Prestressed Concrete: concepts of prestressing; materials; anchorage systems; loss of prestress; analysis of sections for flexure, shear, bond and bearing; analysis of end block and composite sections; beam deflections; cable layout; partial prestress.



Design of prestressed concrete beams for simple and continuous spans; ideas about use of AASHTO – PCI sections for standard spans; design considerations for prestressed concrete pipes, piles, poles and railway sleepers.

Text Books:

- Design of Prestressed Concrete Structure by – T.Y. Lin, Ned H. Burns (3rd Edition)

#### **CE417 Design of Concrete Structures-II**

Credits: 2

Introduction to floor systems and design of column supported slabs (flat plates, detailing of flat plate, direct design method); design of columns under uniaxial and biaxial loading, introduction to slender column; ; seismic detailing; structural design of footings, pile caps; design of RCC shear wall. Prestressed Concrete: concepts of prestressing; materials; anchorage systems; analysis of sections for flexure and shear; design of prestressed concrete beam.

Text Books:

- Design of Concrete Structures by Nilson (14th Edition)
- Reinforced Concrete: Mechanics and Design (6th Edi) by James Wight and James MacGregor
- Prestressed Concrete Structures by Michael P Collins.

#### **CE419 Introduction to Finite Element Method**

Credits: 2

Introduction to finite element method as applied to stress analysis problems; basic equations in elasticity, matrix displacement formulation, element shapes, nodes, nodal unknowns and coordinate system, shape functions, strain displacement matrix, methods for assembling stiffness equations e.g. direct approach, Galerkin's method, virtual work method, principle of minimum potential energy; introduction to isoparametric formulation; discretization of a structure and mesh refinement, one dimensional stress-deformation and two dimensional plane stress and plane strain analysis of stress-deformation problems; numerical integration and computer application.

Text Books:

- Introduction to Solid Mechanics and Finite Element Analysis by Samer Adeeb.
- An Introduction to the Finite Element Method by J N Reddy.
- A First Course in Finite Elements by Jacob Fish and Ted Belytschko.

#### **CE421 Dynamics of Structures**

Credits: 2

Single degree of freedom system, formulation of equation of motion; free vibration response; response to harmonic, impulse and general dynamic loading; vibration analysis by Rayleigh's method; response spectra; two degrees of freedom system

Text Books:

- Dynamics of Structures by Anil K. Chopra (4th Edition)
- Dynamics of Structures by Ray W. Cloughs and J. Penzien.

### **CE423 Design of Concrete Structures-III**

Credits: 2

Analysis and design for torsion; design of one way and two way joist slabs with or without beam on the column line; slender columns; strut-and-tie models (design of deep beam), design of reinforcement at joints; design and detailing of lateral load resisting components.

Textbooks:

- AISC Seismic Provisions for Structural Steel Buildings, ANSI/AISC 341-10
- Structural Seismic Design Optimization and Earthquake Engineering: Formulation and Applications by Vagelis Plevris, Chara Ch. Mitropoulou, Nikos D Lagaros, 2012.
- Computational Methods in Earthquake Engineering by Papadrakakis, Fragiadakis and Lagaros, 2011.
- Journal of Structural Safety by Elsevier (for case studies).

### **Sessional Course**

#### **CE412 Computer Aided Analysis and Design of Structures Sessional**

Credits: 0+1.5

Structural idealization, computer modeling of frame structures, computer aided analysis and design of various reinforced concrete and steel structures, e.g. high-rise building, modular bridge, water tower etc.

Text Books:

- Bangladesh National Building Code (BNBC)-2012
- AASHTO LRFD Bridge: Design Specifications 2012

### **Environmental Engineering**

#### **Theoretical Courses**

#### **CE433 Solid and Hazardous Waste Management**

Credits: 2

Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wastes; solid waste generation (Separation at source); on-site handling, storage and processing; collection of solid wastes; transfer stations and transport; resources and energy recovery and recycling (Reduction, Re-used & Recycling- 3R concept); decomposition of solid waste: anaerobic treatment/biogasification, aerobic treatment/composting; thermal treatment, land disposal. Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; different types of hazardous waste, hazardous waste management plant; methods of treatment (physical, chemical, biological and thermal treatment; fixation/stabilization) and disposal(landfill and ocean dumping) of hazardous waste. Healthcare waste management, categories of healthcare waste, treatment methods of healthcare waste. Integrated solid waste management and live cycle inventory analysis.

Text Books:

- Handbook of Solid Waste Management, Second Edition, by: George Tchobanoglous, Frank Kreith.
- Solid and Hazardous Waste Management, written by Pro Vice-Chancellor of BUET, Professor Dr. M. Habibur Rahman and Assistant Professor of AUST, Dr. Abdullah Al-Muyeed.

### **CE435 Environmental Pollution Management**

Credits: 2

Solid Waste Management: sources and types of solid wastes; physical and chemical properties of solid wastes; solid waste generation (Separation at source); on-site handling, storage and processing; collection of solid wastes; transfer stations and transport; resources and energy recovery and recycling (Reduction, Re-used & Recycling- 3R concept); decomposition of solid waste: anaerobic treatment/biogasification, aerobic treatment/composting; thermal treatment, land disposal.

Hazardous Waste Management: identification, sources and characteristics of hazardous wastes; different types of hazardous waste, hazardous waste management plant; methods of treatment (physical, chemical, biological and thermal treatment; fixation/stabilization) and disposal(landfill and ocean dumping) of hazardous waste. Healthcare waste management, categories of healthcare waste, treatment methods of healthcare waste. Integrated solid waste management and live cycle inventory analysis.

Textbooks:

- Environmental Pollution and Waste Management, H.D. Kumar, M.D. Publications Pvt. Ltd., Jan 1, 1998.
- Understanding Environmental Pollution, Marquita K. Hill, ISBN: 9780521736695, May 2010
- Managing Environmental Pollution, Andrew Farmer, Dec 1997, ISBN-13: 978-0415145152 Edition: 1st

### **CE437 Environmental and Sustainable Management**

Credits: 2

Environment and development projects: environment and sustainable development; environmental policies and legislation; environmental implication of sectoral development; environmental quality standards; environmental issues and priorities; environmental impact assessment of development schemes-baseline. studies, assessment methodologies; economics of environmental management; contemporary issues; case studies.

Textbooks:

- Environmental Management, Sustainable Development and Human Health, Eddie N. Laboy-Nieves, Fred C. Schaffner, Ahmed Abdelhadi, Mattheus F.A. Goosen, October 22, 2008 by CRC Press, ISBN 9780415469630 - CAT# K00082
- Environmental Management for Sustainable Development, Chris Barrow, ISBN-13: 978-0415365352 ISBN-10: 041536535X Edn: 2nd
- Handbook of Sustainability Management, Edited by: Christian N Madu (Pace University, USA), Chu-HuaKuei (Pace University, USA)

### **Sessional Course**

#### **CE432 Design of Water Supply, Sanitation and Sewerage Systems**

Credits: 0+1.5

Design of water supply and sewerage system: estimation of industrial, domestic and fire demands, designing deep tubewell and water distribution network; estimation of industrial, domestic and commercial wastewater generation, wastewater network design; household plumbing system design; design of water and wastewater treatment plant; computer application in environmental engineering; field visits and reporting.

Textbooks:

- Design of Water Supply Pipe Networks, Prabhata K. Swamee, Ashok K. Sharma, 2007 ISBN: 9780470178522, John Wiley & Sons, Inc.
- Gravity Sanitary Sewer Design and Construction, Paul Bizier, Second Edition, American Society of Civil Engineers, Jan 1, 2007.

## **Geotechnical Engineering**

### **Theoretical Courses**

#### **CE443 Earth Retaining Structures**

Credits: 2

Foundation of structures subjected to lateral loads; rigid and flexible earth retaining structures; methods of construction: dewatering and slurry-wall construction, braced excavation, sheet piles, cofferdams, caissons.

Text Books:

- Earth Pressure and Earth-Retaining Structures, (Third Edition) by - Chris R.I. Clayton, Rick I. Woods, Andrew J. Bond, Jarbas Milititsky
- Foundations and Earth Retaining Structures by Muni Budhu.
- Foundations, Retaining and Earth Structures: The Art of Design and Construction and Its Scientific Basis in Soil Mechanics by Gregory Porphyriewitch Tschebotarioff
- Foundation Analysis and design by – Joseph E. Bowles
- Foundation Design by Wayne C. Teng
- Principles Foundation Engineering by – B.M. Das.

#### **CE445 Elementary Soil Dynamics**

Credits: 2

Elementary vibrations; dynamic properties of soil; seismic response of soils: site effects, site amplification, liquefaction problems, remedial measures and earthquake hazards.

Text Books:

- Principles of Soil Dynamics by Braja M Das and Ramana.
- Soil Dynamics with Applications in Vibration and Earthquake Protection by Christos Vrettos.
- An Introduction to Soil Dynamics (Theory and Applications of Transport in Porous Media)” by Arnold Verruijt.
- Practical Soil Dynamics: Case Studies in Earthquake and Geotechnical Engineering (Geotechnical, Geological and Earthquake Engineering) by MilutinSrbulov.

#### **CE447 Soil-Water Interaction**

Credits: 2

Introduction to soil-water interaction problems: permeability, seepage, capillarity and soil suction; slopes subjected to water current, wave action etc; theories of filters and revetment design; geotechnical design of landfills; stability of slopes subjected to seepage.

Text Books:

- Seepage, Drainage, and Flow Nets by Harry R. Cedergren
- Earth and earth-rock dams: engineering problems of design and construction by James L. Sherard.

- Advanced Soil Mechanics (Third edition or later) by Braja M. Das.
- Soil Mechanics and Foundations by Parcher and Means
- BWDB Design Manual- May 2010.

### **Sessional Course**

#### **CE442 Geotechnical Engineering Design Sessional**

Credits: 0+1.5

Interpretation of soil test results, design of foundations: shallow and deep foundation; introduction to computer aided design of foundations; footing, pile, raft/mat foundations; retaining structures; reinforced soils.

Text Books:

- Foundation Analysis and design by – Joseph E. Bowles
- Foundation Design by Wayne C. Teng
- Foundation engineering by – Peck, Hanson, Thornburn
- Principles Foundation Engineering by – B.M. Das
- Geotechnical Engineering - A Practical Problem Solving Approach (2010) by N. Sivakugan and Braja M. Das
- Bangladesh National Building Code (BNBC)'93.

### **Transportation Engineering**

#### **Theoretical Courses**

#### **CE455 Transportation Engineering-III: Traffic Engineering Design and Management**

Credits: 2

Advanced concepts of traffic management, management strategies; analysis of traffic flow characteristics; traffic control devices; intersection control and design; grade separation and interchanges; computer application in traffic system analysis; introduction to micro simulation and ITS; NMT issues and road safety.

Text Books:

- Highway Engineering by - Paul H Wright
- Traffic Engineering and Transport Planning by – L.R. Kadiyali
- Highways – The Location, Design, Construction by – Flaherty
- Principles of Transportation Engineering by – Das
- Transportation Engineering Handbook by – Geulias
- Traffic and Highway Engineering by – Garber

#### **CE457 Transportation Engineering-IV: Pavement Management, Drainage and Airport**

Credits: 2

Pavement management systems; evaluation and strengthening of pavements; drainage: highway drainage and drainage structures; airports: importance, advantages and trends in air transportation, planning and design of airports, aircraft characteristics related to airport design, types and elements of airport planning studies, airport configuration, geometric design of the landing area, terminal area, heliports, design of

airport pavements, lighting, marking and signing, airport drainage, introduction to airside planning, design and operations software.

Text Books:

- Principles of Pavement Design by – E.J. Yoder
- Traffic Engineering and Transport Planning by – L.R. Kadiyali
- Highways – The Location, Design, Construction by – Flaherty

**CE459 Transportation Engineering-V:  
Urban Transportation Planning and Management**

Credits: 2

The urban transport problems and trends; road network planning; characteristics and operation of different transit and para-transit modes, planning transit network; estimating system costs and benefits, pricing and financing, evaluation, transit users attitude, policies and strategies for transit development in metropolitan cities; freight traffic planning and management; selected transport case studies, congestion management; safety management; environmental issues and sustainable transport.

Text Books:

- Traffic Engineering and Transport Planning by – L.R. Kadiyali
- Transportation Engineering Handbook by – Geulias
- Traffic and Highway Engineering by – Garber

**Sessional Course**

**CE454 Transportation Engineering Sessional-II: Pavement Design and Traffic Studies**

Credits: 0+1.5

Design of flexible and rigid pavement and air field pavements; geometric design; road intersection design and interchanges; traffic studies; computer models and application packages.

Text Books:

- Highway Engineering by - Paul H Wright
- Principles of Pavement Design by – E.J. Yoder
- Traffic Engineering and Transport Planning by – L.R. Kadiyali
- Laboratory Handbook

**Water Resources Engineering**

**Theoretical Courses**

**CE465 Flood Mitigation and Management**

Credits: 2

Flood and its causes; methods of flood management: structural and non structural measures such as reservoirs, levees and flood walls, channel improvement, interior drainage, floodways, land management, flood proofing, flood zoning, flood hazard mapping, flood forecasting and warning. Economic aspects of flood management: flood risk and vulnerability analysis, direct and indirect losses of flood, flood damage assessment, flood damage in urban and rural areas.

**CE467 Groundwater Engineering**

Credits: 2

Groundwater in hydrologic cycle and its occurrence. Physical properties and principles of groundwater movement. Groundwater and well hydraulics. Groundwater resource evaluation. Groundwater levels and environmental influences. Water mining and land subsidence. Groundwater pollution and contaminant transport. Recharge of groundwater. Saline water intrusion in aquifers. Groundwater management.

Text Books:

- Groundwater Hydrology by – Rushton.
- Groundwater Engineering by – Toad.

**CE469 River Engineering**

Credits: 2

Behavior of alluvial rivers; river channel pattern and fluvial processes; aggradations and degradation, local scours, river training and bank protection works; navigation and dredging sediment movement in river channels, bed form and flow regimes.

Text Books:

- Principles of River Engineering by – Chang
- Principles of River Engineering by – Garg
- River Engineering by – Peterson.
- Sediment Transport Technology (Water & Sediment Dynamics) by – Daryl B. Simons & Fuat Sentirk.

**CE471 Hydraulic Structures**

Credits: 2

Principles of design hydraulic structures, types of hydraulic structures; design of dams, barrages, weirs, spillways, energy dissipators and spillway gates; cross drainage works.

Text Books:

- Hydraulic Structures by – Garg.
- Open Channel Hydraulics by – V. T. Chow.

**CE473 Coastal Engineering**

Credits: 2

Coast and coastal features; tides and currents; tidal flow measurement; waves and storm surges; docks and harbors; forces of waves and tides in the design of coastal and harbor structures; coastal sedimentation processes; deltas and estuaries; shore protection works; dredging and dredgers.

**Sessional Course****CE462 Water Resources Engineering Sessional**

Credits: 0+1.5

Design of hydraulic structures, river training works.

Text Books:

- Hydraulic Structures by – Garg

- Open Channel Hydraulics by – Chow
- Principles of River Engineering by – Garg
- Principles of River Engineering by – Chang
- Principles of Water Resources Planning by – Dr. Aynon Nishat (BUET).

**Thesis/Project/Internship: [Wither CE498 or CE499 on Major Group] 6 Credits**

**CE498 Thesis/Project**

Credits: 6

Students will be assigned a thesis or a project topic from student's major group under the supervision of a faculty member.

**CE499 Internship**

Credits: 6

Students will be placed for internship of one semester duration in an organization doing technical works in the field of student's major group. The student will be assigned a faculty supervisor to monitor the progress of the internship work.