Department of Soil Science
Bangladesh Agricultural University
Mymensingh

Level: 1, Semester: 1
Course code & Title: SS1205, Soil Science, Credit: 2

Rationale
Students need to know the concepts of soil formation, soil genesis, soil composition, physicochemical properties of soils, soil microbiological properties and relationships between plant and soils.

Course Learning Outcomes (CLOs)

- Interpret soil and its components
- Characterize rocks and minerals and their weathering processes, soil forming processes and factors
- Illustrate soil physical and chemical properties and their significance in crop production
- Identify essential plant nutrients, their functions and sources
- Analyze soil water regimes and their importance
- Describe soils of Bangladesh and to evaluate land distribution and their use

CLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO 1	xx									
CLO 2	xx	xx								
CLO 3					xx	xx				
CLO 4					xx			xx		
CLO 5				Xx			xx			
CLO 6				Xx			xx			

Course Content	CLO	No. of lecture
Soil genesis: a) Rocks and minerals- classification and properties, b) Weathering - physical and chemical weathering, c) Soil forming factors (climate, biosphere, parent material, relief and time) and processes (laterization, podzolization and calcification) and d) Soil profile: horizons, solum, regolith, monolith, eluviation and illuviation	1, 2	8
Soil properties: a) Physical-Soil particles, Soil texture, Soil structure, particle density, bulk density, Soil porosity, Soil air, Soil colour, Soil temperature, Soil consistency, b) Chemical- Soil pH, Ion exchange in soil and c) Biological- Soil organisms and their importance	3	11
Soil fertility and Plant nutrients: Plant nutrients- Criteria for essentiality, available forms and source, macro and micronutrient, and their functions	4	3
Soil Water: Importance and classification of soil water, Evapotranspiration	5	4
Soils of Bangladesh: Agroecological zones of Bangladesh, Concept, location, extent and crops grown, Problem soils of Bangladesh	6	6
	Total lecture	**32**

Teaching strategy
Lectures, Question & answering, Tutorial, Self-study, Case study, Group studies, and Video clips

Assessment strategy
Question and answer, Assignment, Quiz, and Observation

Evaluation
Grading for this course will be determined in accordance with the following weightage

Class attendance	10%
Class Test: In-class written test 55 minutes	20%
Final Examination (Written test of 2 hours	70%

Books recommended

1. Baver, L.D., Gardner, W. H. and Gardner, W.R. 1972. Soil Physics, 4th edition. John Wiley & Sons. Inc., New York.
2. Brady, N.C. and Weil, R.R. 2006. The Nature and Properties of Soils. Thirteen edition Pearson Education Pvt. Ltd. New Delhi, India.
3. Brammer, H. 1996.The Geography of the Soils of Bangladesh. University Press Ltd., Dhaka, Bangladesh.
4. Foth H.D. 1991 Fundamentals of Soil Science. 8th edition, Willey and Black, USA.
5. Hussain, M.S. 1992. Soil Classification with Special Reference to the Soils of Bangladesh. University of Dhaka.
6. Kohnke, H. 1968. Soil Physics. McGraw Hill Book Comp., New York.
7. Miller C.E., Turk L.M., Foth H.D. Fundamentals of Soil Science, 4th edition.
8. Miller, R.W. and Donahue, R.L. 1990. Soils- An Introduction to Soils and Plant Growth. Prentice Hall Inc. USA.
9. Subba Rao, N.S. 1987. Advances in Agricultural Microbiology. Oxford and IBH Pub. Co., New Delhi.

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Level: 1, Semester: 1
Course code & Title: SS1206, Soil Science, Credit: 1

Rationale:
In order to get students acquainted with practical aspects of soils including measurement of soil physical and chemical properties and identification of rocks and minerals for better management of soil towards improved crop production

Course Learning Outcomes (CLOs)

- Understand soil sampling collection and preparation process
- Characterize rocks and minerals
- Calculate and interpret soil density and their significance in crop production
- Estimate the soil porosity in relation to crop production
- Analyze soil water constants and their importance
- Categorize soil textural class
- Calculate the soil organic matter content of Bangladesh and to evaluate soil fertility and productivity status

CLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO 1	xx									
CLO 2	xx									
CLO 3			xx				xx			
CLO 4							xx			
CLO 5				xx						xx
CLO 6		xx					xx			
CLO 7			xx		xx	xx				

Course Content	CLOs	No. of lecture
Collection and preparation of soil samples	1	2
Identification of different rocks and minerals	2	1
Determination of particle density of soil by volumetric flask method	3	1
Determination of bulk density of soil by core sampler method	3	1
Estimation of soil porosity	4	1
Determination of soil pH by glass electrode pH meter	5	1
Determination of soil water by gravimetric method	5	1
Particle size analysis of soil by hydrometer method	6	2
Determination of soil organic carbon by wet oxidation method	7	2
	Total lecture	**12**

Teaching strategy
Lectures, Question & answering, Tutorial, Self-study, Case study, Group studies, and Video clips

Assessment strategy
Question and answer, Assignment, Quiz, and Observation

Evaluation
Grading for this course will be determined in accordance with the following weightage

Class attendance	10%
Class Test: In-class written test, viva voce, laboratory analysis and note book	20%
Final Examination In-class written test, viva voce, laboratory analysis and note book	70%

Books recommended

1. Jackson, M.L. 1962. Soil Chemical Analysis. Prentice Hall, New York.
2. Klute, A. 1986. Methods of Soil Analysis, Part 1, Amer. Soc. Agron., Madison, Inc. Pub., Wis., USA
3. Lal R., Kimble J.M., Follett R.F. and Stewart B.A. Assessment Methods for Soil Carbon, CRC press, USA.
4. Page, A.L., Miller, R.H. and Keeney, D.R. 1982. Methods of Soil Analysis Part 3, Chemical methods, SSSA, Madison, Inc. Pub., Wis., USA

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Level: 4, Semester: 1
Course code & Title: SS4103, Soil Physics, Credit: 2

Rationale:
In order to engage in agricultural engineering services students need to deal with soil physical properties and processes and their relevance to soil water management, nutrient and water flow through soils, heat flow and mechanical analysis of soils

Course Learning Outcomes (CLOs)

- Describe inter-relationship between soil mass and volume
- Measure soil water content and potential for irrigation scheduling and energy balance
- Describe hydraulic properties of soils and estimate rate of water and solute flow
- Interpret thermal properties of soils and regulation of temperature
- Describe soil mechanical processes and impacts of management practices on soil physical processes

CLO/PLO	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10
CLO 1	xx	xx								
CLO 2				xx			xx			
CLO 3			xx		xx		xx			
CLO 4				xx						
CLO 5			xx				xx			

Course Content	CLOs	No. of lecture
Physical characteristics of soil: Soil as a disperse three phase system, Mass volume relationship of soil constituents	1	3
Soil water: Concepts of soil water, Factors affecting soil water retention, Methods of measuring soil water- gravimetric, tensiometer and neutron scattering method, Soil water potential- metric potential, pressure potential, gravitational potential, osmotic potential, Measurement of metric potential by tensiometer method	2	7
Water movement: Infiltration-definition, factors affecting, equations, methods of measurement, Hydraulic conductivity- definition, Darcy's law, methods of measurement, classes of hydraulic conductivity	3	6
Soil temperature: Importance, factor affecting and management of soil temperature, Thermal properties of soils, Heat flow equation	4	5
Mechanical analysis: Principle and methods, Derivation of Stokes' law	5	3
Soil consistency and tillage: Forms of soil consistency, swelling, shrinkage, Tillage and puddling, Plough pan- formation, effects on soils and crops	5	8
	Total lecture	**32**

Teaching strategy
Lectures, Discussion, Demonstration by video, Question & answer (QA), Self-studies, Case studies, Practice and Group studies.

Assessment strategy
Question and answer, Assignment, Quiz, and Observation

Evaluation
Grading for this course will be determined in accordance with the following weighting:

Class attendance	10%
Class Test: In-class written test of 55 minutes	20%
Final Examination (Written test of 2 hours)	70%

Books recommended *[Maximum 7]*

1. Hanks, R.J. and Ashcroft, F.L. 1980. Applied Soil Physics. Springer - Verlag, Berlin
2. Hillel, D. 1980. Fundamental of Soil Physics. Acad. Press, New York, USA.
3. Marshall, C.E. 1964. The Physical Chemistry and Mineralogy of Soils, John Wiley & sons. New York. USA.
4. Michael A.M. 1978. Irrigation- Theory and Practice, Vikas Publishing House Pvt. Ltd. New Delhi, India
5. Miller, R.W. and Donahue, R.L. 1990. Soils- An Introduction to Soils and Plant Growth. Prentice Hall Inc. USA.