SHIVAJI UNIVERSITY, KOLHAPUR
CENTRE FOR COMMUNITY DEVELOPMENT

LABORATORY MANAGEMENT AND SOIL ANALYSIS

Objectives
1.To acquire skills for Laboratory Management and routine analysis of soil.
2.To improve working ability in analytical laboratory.

Course Duration: 3 Months

Eligibility for Admission: 12th Science pass or equivalent

Medium of Instruction: English

Job Opportunities
1. Can avail the services to general analytical industries.
2. Can start own analytical laboratory.

Course Fees per Student: Rs.1500/- + Rs.150 Evaluation Fee

Objectives
The students after H.S.C. has one of the more exciting and rewarding turning time of life Course is designed as a new non-conventional alternative for the future. The course can be completed as part along with the graduation. The certificate obtained will be helpful for obtaining jobs in various fields. The student can start his own business/laboratory of can associate with any kind of laboratory or associated jobs with confidence. There are opportunities in the field of analysis, analytical research, fundamental research, quality control departments, governmental and non-governmental organizations etc. for the technical laboratory personnel. In addition to this the college conducting this course can avail the services to general public and industries and raise funds for development.

1.To acquire skills for Laboratory Management and routine analysis of soil, water and food.
2.To improve working ability in analytical laboratory.

Staff Qualifications:
1. B.Sc. with 3 year's experience in analytical laboratory.
2. M. Sc. or higher qualification in Microbiology, Chemistry, Zoology, Botany, Biochemistry, Environmental Science, Nutrition, Pollution, Management.
3. Laboratory attendant with H. S. C. Science Pass of Fail.

Infrastructure and other Requirement
1. Standard laboratory with required equipments with basic facilities of light, Ventilation, Water, gas connection, sinks, firefighting equipments etc.
2. The following equipments are required in working condition: PH meter, Conductivity meter, Oven, Bacteriological incubator, Water still, Vutyro refractometer, Muffle furnace, reflux apparatus, photo colorimeter or spectrophotometer, flame photometer, Soxhlet apparatus, Kjeldahl's apparatus, Microscope with oil immersion lens. The apparatus not available in parent institute can be hired form other competent laboratory/ college. The consent letters from the institute must be produced during inspection.

   - Some of the particles can be conducted in other institutes with previous written M.O.A. between two institutes.

3. The minimum books included as reference books in syllabus must be available. Other books and journals, audio visuals etc. in the subject will be additional preference point for affiliation.
4. Preference will be given to the colleges having microbiology department along with chemistry department.

SYLLABUS

LABORATORY QUALITY MANAGEMENT

1. Basic fundamentals in Analysis **(4)**
   A) Analytical Chemistry, Titrimetric, gravimetric, instrumental analysis.
   B) Analytical Physics, Physical tests.
   C) Analytical Biology.
2. Instrumentation – Types, Principles, Maintenance, Operation, Working **(4)**
   G.C., H.P.L.C., G.L.C., A.A.S., Organic C analyzer
3. Fundamentals in sampling methods, Preparation of reagents & culture **(4)**
   media (Simple, Differential & Special) sterilization, inoculation, microbial staining methods (Wet mounting, Gram's staining, Monochrome staining.)
4. Mathematical calculations in analysis- Concentration calculations, **(2)**
   PPm, PPb, mg/1, Kg/ha, % normal, Molar Ug/100 gm calculations.
5. Analytical work in various laboratories like Soil, Water, Food, Industry, **(3)**
   Pathological, Environmental, Industrial, Fertilizer Industry.
6. Quality control management in laboratory. Standardization of reagents, **(2)**
   solutions, cross analysis.
7. Safety and precautions in laboratory. General safety, ventilation, **(3)**
   equipment arrangement, safety wares , first aid, handling and disposal of hazardous samples.
8. Accuracy and precision maintenance in laboratory. **(2)**
9. Report presentation and interpretation of results. **(2)**
10. Laboratory management and Personality development. **(2)**

Reference Books

1. Basic concepts of analytical chemistry By S. M. Khopkar.
2. Vogel's textbook of quantitative chemical analysis. (Longman) ELBS) Edn.
3. Handbook of organic qualitative analysis, By Clarke.
4. Vigel's text book of qualitative chemical analysis. (Longman) ELBS) Edn.
5. Basic laboratory studies in college chemistry By herd & Nebergali.
6. Instrumental methods of analysis By Dr. B. K. Sharma.

(3)

SOIL ANALYSIS

1. Soil development and Chemical composition, Formation of clay minerals, Soil forming process, composition of earth's, crust, minerals in soil, contents of chemical elements of soil, Physical chemistry of soil. **(3)**
2. Soil organic matter, formation, importance, organic fertilizers. **(3)**
3. Soil microbiology and biochemistry. Microorganisms in soil, biochemical activities of microorganisms, enzymatic reactions, role of soil ecology in geo chemical cycles microorganisms, enzymatic reactions, role of soi ecology in geo chemical cycles.
4. Acid, Alkali, Saline and sodic soils – Cause and prevention measures **(2)**
5. Trace elements in soil- biological importance. Effects due to deficiency and excess quantity. **(2)**
6. Standards of soil quality required for various crops **(2)**
7. Soil pollution cause and remedies. **(3)**
8. Soil borne Plant diseases and pests, their control, Bio pesticides. **(2)**

Practicals:

1.Collection and preservation of samples from general field, horticultural field and green house**.**
2. Study of instruments in analysis PH meter, conductivity meter, Flame photometer. Spectrophotometer, Kjeldahl's apparatus, Soxhlet apparatus, Muffle furnace, Hot air oven , Bacteriological incubator, BOD incubator, Centrifuge, Autoclave.
3. Determination of PH and Electrical Conductivity of soil.
4. Determination of water holding capacity.
5. Determination of Lime and Gypsum requirement.
6. Determination of Nitrogen
7. Determination of Phosphorous.
8. Determination of Potassium.
9. Determination of Organic carbon.
10. Determination of Total differential count of microorganisms.
11. Microscopic identification of nematodes from soil.

Reference Books

1. Text book of soil chemical analysis by Murray Heses P. R.
2. Chemistry of soil by Firman E. Bear.
3. A text book of analysis by T. C. Barua.
4. Analytical agricultural chemistry by J.S. Kanwar, S. L.Chopra.
5.Practical methods in ecology & Environmental science by R. K. Trivedi, P. K. Goel, C. L. Trisal.
6. Handbook of agricultural sciences By I.C.A.R.