Subject: Botany (BOTA)				
BSc				
Semester	**Course code**	**Course name**	**Credit value**	**Status**
1	BIOL 11522	Genetics	2	Compulsory
	BOTA 11532	Organic Gardening*	2	Auxiliary
2	BOTA 12514	Morphology, Anatomy and Taxonomy of Angiosperms	4	Compulsory
	BOTA 12522	Morphology, Anatomy and Taxonomy of Angiosperms Laboratory	2	Compulsory
3	BOTA 21513	Plant Physiology	3	Compulsory
	BOTA 21522	Plant Physiology Laboratory	2	Compulsory
	BOTA 21531	Statistics and Data Analysis	1	Compulsory
4	BOTA 22544	Plant Evolution and Diversity	4	Compulsory
	BOTA 22552	Plant Evolution and Diversity Laboratory	2	Compulsory
	BOTA 22563	Floristic Resources and Management**	3	Compulsory
	BOTA 22573	Plant Diversity**	3	Compulsory
5	BOTA 31514	Ecology and Environmental Resources Management	4	Compulsory
	BOTA 31522	Ecology and Environmental Resources Management Laboratory	2	Compulsory
	PRPL 31992	Professional Placement	2	Optional
6	BOTA 32534	Plant Pathology, Tissue Culture and Gene Technology	4	Optional
	BOTA 32542	Plant Pathology, Tissue Culture and Gene Technology Laboratory	2	Optional
	BOTA 32554	Horticulture and Post-harvest Biology	4	Optional

*Offered during alternate academic years for non-Biology students.

**Offered for ENCM programme.

Subject: Botany (BOTA)				
BSc Honours				
Semester	**Course code**	**Course name**	**Credit value**	**Status**
5	BOTA 41766	Plant Systematics and Bioinformatics	6	Compulsory
6	BOTA 42776	Plant Physiology and Biochemistry	6	Compulsory
7	BOTA 41784	Plant Pathology	4	Compulsory
	BOTA 41793	Applied Microbiology	3	Compulsory
	BOTA 41803	Economic Botany	3	Compulsory
	BOTA 41813	Plant Breeding	3	Compulsory
	BOTA 41823	Forest Management and Soil Nutrient Dynamics	3	Compulsory
	BOTA 43838	Research Project	8	Compulsory
	BOTA 43842	Term Paper	2	Compulsory
8	BOTA 42853	Ecology of Sustainability	3	Compulsory
	BOTA 42864	Molecular and Microbial Genetics	4	Compulsory
	BOTA 42873	Fungal Ecophysiology and Applied Mycology	3	Compulsory

Semester	1		
Course Code	BIOL 11522		
Course Name	**Genetics**		
Credit Value	2		
Core/Optional	Core		
Pre-requisite	G.C.E (A/L) Biology		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	15 hrs	55 hrs,

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- describe the principles of inheritance,
- explain fundamentals of molecular genetics, and
- apply the knowledge gained in solving basic problems within the context of genetics.

Course Content:

Review of Mendelian genetics and extensions of Mendelian pattern of inheritance, genetic basis of sex determination and sex-linked inheritance. Linkage and gene mapping. Molecular organization of genetic material. Gene and gene function: Introduction to prokaryotic gene expression, transcription and genetic aspects of translation. Introduction to population genetics. Mutations. Human genome and molecular basis of common human genetic diseases. Fundamentals of the genomes of selected model organisms. Applications of molecular biology and genetics.

Teaching/Learning Methods: Lectures, laboratory exercises and assignments

Assessment Strategy: Continuous assessment and end of course unit written examination

Continuous Assessment 20%	**Final Assessment** 80%		
Details: Oral presentation 10%, Lab reports 5%, Assignments/quizzes 5%	**Theory (%)** 80%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B. and Doebley, J. 2012. *An Introduction to Genetic Analysis*. 10th Edition. W H Freeman.
2. Snustad, D.P. and Simmons, M.J. 2011. *Principles of Genetics*. 6th Edition. John Wiley and Sons.
3. Synder, L., Peters, J.E., Henkin, T.M and Champness, W. 2013. *Molecular Genetics of Bacteria*. 4th Edition. American Society for Microbiology.

Semester	1		
Course Code	BOTA 11532*		
Course Name	**Organic Gardening**		
Credit Value	2		
Core/Optional	Auxiliary		
Pre-requisite	-		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	15 hrs	15 hrs	70 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- understand the importance of organic methods used in crop production,
- explain the biological principles and ecological approaches of organic gardening, and
- use organic gardening methods in sustainable crop production with minimum environmental hazards.

Course Content:

Organic gardening: Soil as a medium for plant growth and requirements of plants, Meeting crop nutrition needs with organic material, Decomposition of soil organic matter and ex-situ and in-situ compost production using organic waste, The use of locally available organic material in gardening: cover crops, organic mulch, bio-fertilizer and farm manures.

Desired agronomic practices, intercropping, crop rotation and mixed cropping systems. Organic methods of weeds, pest and disease control and integrated pest and disease management, Advantages of organic gardening. Economic sustainability of organic farming.			
Teaching/Learning Methods: Lectures elaborated with demonstrations			
Assessment Strategy: Continuous assessment and end of course unit written examination			
Continuous Assessment 35%	**Final Assessment** 65%		
Details: Reports 35%	**Theory (%)** 40%	**Practical (%)** 25%	**Other (%)** -
References/Reading Materials: 1. Baker, A.V. 2010. *Science and Technology of Organic Farming*. CRC Press, Taylor and Francis Group, Boca Raton. 2. Hansen, A.H. 2010. *The Organic Farming Manual: A Comprehensive Guide to Starting and Running a Certified Organic Farm*. Storey Publishing, LLC. 3. Hamilton, G. 2011. *Organic Gardening*, DK; New Rev Up edition.			

* Offered during alternate academic years for non Biology students

Semester	2		
Course Code	BOTA 12514		
Course Name	**Morphology, Anatomy and Taxonomy of Angiosperms**		
Credit Value	4		
Core/Optional	Core		
Pre-requisite	All BIOL course units		
Co-requisite	BOTA 12522		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	-	140 hrs
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to, ➢ describe the form and structure of the plant, and ➢ discuss trends in angiosperm taxonomy.			
Course Content: Cell as a biological unit of molecular organization, Cells and tissues, Growth, morphogenesis and differentiation of the plant body. Primary and secondary structures and anomalous growth. Morphology of vegetative and reproductive organs. Plant classification systems, sources of taxonomic information, interpretation of taxonomic relationships and modern trends in plant taxonomy.			
Teaching/Learning Methods: Lectures, tutorials, presentations, assignments, computer-assisted learning			
Assessment Strategy: Continuous assessment and end of course unit written examination			
Continuous Assessment 10%	**Final Assessment** 90%		
Details: Assignment 10%	**Theory (%)** 90%	**Practical (%)** -	**Other (%)** -
References/Reading Materials: 1. Gifford, E.M. and Foster, A.S. 1989. *Morphology and Evolution of Vascular Plants*. W. H. Freeman. 2. Esau, K. 1977. *Anatomy of Seed Plants*. John Wiley & Sons. 3. Dickison, W.C. 2000. *Integrative Plant Anatomy*. Academic Press. 4. Jones, S.B. and Luchsinger, A.E. 1986. *Plant Systematics*. McGraw- Hill. 5. Heywood, V.H. 1976. *Plant Taxonomy*. Biology No.5.4. Institute of Biology Studies. 6. Evert, R.F. and Eichhorn, S.E. 2013. *Biology of Plants*. 8th Edition. W.H. Freeman and Company Publishers, New York.			

Semester	2		
Course Code	BOTA 12522		
Course Name	**Morphology, Anatomy and Taxonomy of Angiosperms Laboratory**		
Credit Value	2		
Core/Optional	Core		
Pre-requisite	-		
Co-requisite	BOTA 12514		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	-	60 hrs	40 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- improve observational skills and the ability to use drawings and illustrations to recognize the form and structure of plants, and
- develop skills in identification, characterization and interpretation relationships of angiosperm families.

Course Content:

Cellular organization. Cells and tissue distribution. Primary and secondary tissues of angiosperms. Morphological features and modifications of root and shoot systems. Cronquist's system of classification, diagnostic features of plant families, use and construction of diagnostic keys, cluster analysis. Herbarium techniques.

Teaching/Learning Methods: Laboratory and field exercises, Individual and group assignments, Laboratory manuals

Assessment Strategy: Continuous assessment and end of course unit practical examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Laboratory reports 5%, Anatomy sections 10%, Assignments 15%	**Theory (%)** -	**Practical (%)** 70%	**Other (%)** -

References/Reading Materials:

1. Heywood, V.H. 1993. *Flowering Plants of the World*. B. T. Batsford Ltd. London.
2. Raven, P., Johnson, G.B., Mason, K.A., Losos J.B. and Singer, S.S. 2013. *Biology*. McGraw-Hill.
3. Senanayake, S.P., Kannangara, S. and Ratnayake, R.M.C.S. 2006. *Morphology, Anatomy and Taxonomy of Angiosperms*. Laboratory Manual.
4. Ragland, A. 2014. *Plant Anatomy & Microtechniques*. Saras Publication.

Semester	3		
Course Code	BOTA 21513		
Course Name	**Plant Physiology**		
Credit Value	3		
Core/Optional	Core		
Pre-requisite	BOTA 12514		
Co-requisite	BOTA 21522		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	45 hrs	-	105 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to explain how terrestrial vascular plants acquire and use the energy and material resources needed to complete their life cycle, highlighting relationships between structure and function.

Course Content:

Chemical basis of life. pH scale and buffers. Water relations: water potential concept, cell and plant water relations. Stomatal physiology. Photosynthesis: photochemistry and electron transport, photophosphorylation, carbon reduction cycle, C3, C4 and CAM pathways, photorespiration, phloem transport. Mineral nutrition: essential nutrients, deficiencies, plant disorders, characteristics and mechanisms of solute absorption and transport, mineral stresses. Growth and development: germination and growth characteristics, phytohormones and growth inhibitors, hormone as a signal transducer, photoperiodism, importance of phytochrome in plant responses to light environment,

vernalization, plant movements, seed and bud dormancy.			
Teaching/Learning Methods: Study Guide, lectures, computer-assisted learning and tutorials			
Assessment Strategy: End of course unit written examination			
Continuous Assessment 10%	**Final Assessment** 90%		
Details: Assignment - Creation of a video on plant physiological processes 10%	**Theory (%)** 90%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Hopkins, W.G. and Huener, N.P.A. 2009. *Introduction to Plant Physiology*.4th edition. John Wiley & Sons, Inc., New Jersey.
2. Taiz, L. and Zeiger, E. 2010. *Plant Physiology*, 5th edition. Sinauer Associates, Inc., Massachusetts.
3. Jayasekera, L.R. 2009. Plant Physiology Study Guide, University of Kelaniya.

Semester	3		
Course Code	BOTA 21522		
Course Name	**Plant Physiology Laboratory**		
Credit Value	2		
Core/Optional	Core		
Pre-requisite	-		
Co-requisite	BOTA 21513		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	-	60 hrs	40 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- describe the scientific method and how it would be applied to a novel problem,
- demonstrate essential understanding and basic skills needed in studying plant functions, and
- skills in writing a scientific report.

Course Content:

Preparation of aqueous solutions and buffers. Using the scientific method in laboratory experiments. Determination of water potential and solute potential. Measurement of transpiration. Stomatal movement. Separation of photosynthetic pigments. The Hill reaction. Acid accumulation of CAM plants. Shoot morphology and leaf anatomy in relation to photosynthetic efficiency: determination of leaf area, leaf dry weight and specific leaf area (SLA), measurement of stomatal conductance and irradiance levels at different heights. Demonstration of photosystem II activity. Differentiation between C3 and C4 plants by detection of starch. Studies on membrane permeability. Mineral deficiency symptoms in plants. Hormonal action. Seed viability and germination tests. Description of data using statistics.

Teaching/Learning Methods: Laboratory exercises supplemented with computer-assisted learning and field exercises			
Assessment Strategy: Lab reports and end of the course unit practical examination.			
Continuous Assessment 10%	**Final Assessment** 90%		
Details: Laboratory reports 10%	**Theory (%)** -	**Practical (%)** 90%	**Other (%)** -

References/Reading Materials:

1. Jayasekera, L.R. 2007. Plant Physiology Laboratory Manual, University of Kelaniya.
2. Larcher, W. 2003. *Physiological Plant Ecology*. 4th edition. Springer Verlag, Berlin, New York.

Semester	3		
Course Code	BOTA 21531		
Course Name	**Statistics and Data Analysis**		
Credit Value	1		
Core/Optional	Core		
Pre-requisite	-		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	10 hrs	15 hrs	25 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate the ability to gather, analyze and interpret data/information using the scientific method as they apply to biological sciences.

Course Content:
The scientific method. Descriptive statistics: graphical methods and classification of data, measures of variation. Inferential statistics: Chi-square test, student's t-test, ANOVA (analysis of variance) and ANACOVA (analysis of covariance), mean separation. Correlation and regression. Designing experiments and testing hypotheses, use of software packages for data analysis (MINITAB).

Teaching/Learning Methods: Lectures and computer-assisted learning

Assessment Strategy: Continuous assessment and end of course unit written examination

Continuous Assessment 20%	**Final Assessment** 80%		
Details: Laboratory reports 10%, Project proposal writing 10%	**Theory (%)** 20%	**Practical (%)** 60%	**Other (%)** -

References/Reading Materials:

1. Hoshmmand, A.R. 1988. *Statistical Methods for Agricultural Sciences*. Timber Press, OR, USA
2. Ott, L.R. and Longnecker, M. 2010. *An introduction to Statistical Methods and Data Analysis*. 6th edition, Brooks/Cole.

Semester	4		
Course Code	BOTA 22544		
Course Name	**Plant Evolution and Diversity**		
Credit Value	4		
Core/Optional	Core		
Pre-requisite	BOTA 12514		
Co-requisite	BOTA 22552		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	-	140 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to explain how plants have evolved and phylogenetic relationships amongst diverse groups of organisms.

Course Content:
Biological classification and evolutionary relationships of organisms. Prokaryotes: archaebacteria, eubacteria, in their environments. Origin of the eukaryotic cell, fungi, lichens, algae, green alga as common ancestor of plants, non vascular plants, seedless vascular plants, seed plants. Plants as pioneers of the terrestrial environment.

Teaching/Learning Methods: Lectures, group presentations, group assignments, computer-assisted learning and tutorials.

Assessment Strategy: Continuous assessment, group presentations, assignment reports and end of course unit written examination.

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Group presentation 30%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Campbell, N.A. and Reece, J.B. 2010. 9th Edition. *Biology*. Benjamin Cummings.
2. Gifford, E.M. and Foster, A.S. 1989. *Morphology and Evolution of Vascular Plants*. W. H. Freeman.
3. Evert, R.F. and Eichhorn, S.E. 2013. *Biology of Plants*. 8th Edition. W.H. Freeman and Company Publishers, New York.
4. Webster, J. 1993. *Introduction to Fungi*. Cambridge University.
5. Raven, P., Johnson, G.B., Mason, K.A., Losos, J.B. and Singer, S.S. 2013. *Biology*. McGraw-Hill.

Semester	4		
Course Code	BOTA 22552		
Course Name	**Plant Evolution and Diversity Laboratory**		
Credit Value	2		
Core/Optional	Core		
Pre-requisite	-		
Co-requisite	BOTA 22544		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	-	60 hrs	40 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate skills in,

- identifying and distinguishing morphologically different bacteria including cyanobacteria and diverse groups of fungi, algae, bryophytes, pteridophytes, gymnosperms and angiosperms using their characteristic features, and
- plant diversity assessment.

Course Content:
Identification and illustration of morphological features of bacteria, reproductive and vegetative structures of fungi, algae, bryophytes, seedless vascular plants and seed plants. Diversity assessments of lichens and algae using Minitab software package.

Teaching/Learning Methods: Laboratory and field exercises and computer assisted learning

Assessment Strategy: Continuous assessment and end of course unit practical examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Laboratory reports 10%, Assignment reports 20%	**Theory (%)** -	**Practical (%)** 70%	**Other (%)** -

References/Reading Materials:

1. Perry, J.W. and Morton, D. 1996. *Photo Atlas for Biology*. Wadsworth.
2. Evert, R.F. and Eichhorn, S.E. 2013. *Biology of Plants*. 8th Edition. W.H. Freeman and Company Publishers, New York.
3. Raven, P., Johnson, G.B., Mason, K.A., Losos, J.B. and Singer, S.S. 2013. *Biology*. McGraw-Hill.

Semester	4
Course Code	BOTA 22563**
Course Name	**Floristic Resources and Management**
Credit Value	3
Core/Optional	Core
Pre-requisites	ENCM 11512 and ENCM 11522

Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	40 hrs	80 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- explain richness and conservation of flora and crop wild relatives of Sri Lanka,
- discuss significance and management of invasive flora,
- describe cropping systems and cultural practices used in sustainable organic agriculture, and
- explain biological principles involved in organic agriculture.

Course Content:

Flora of Sri Lanka: floristic composition: endemic, exotic and indigenous flora and their uses. Relationships between floristic composition and climate. Conservational status and conservation methods of flora. Crop wild relatives and their potential uses. Exotic flora and invasive plants and their adverse impacts, management and potential uses. Biological principles, and approaches used in production of bio fuels, bio fertilizer, green manure and agroforestry. Uses of botanicals, bio fuels, bio fertilizer, green manure, cover crops and organic solid waste in organic agriculture. Desired agronomic and cultural practices used for sustainable organic crop management.

Teaching/Learning Methods: Lectures, laboratory and field practicals and assignments

Assessment Strategy: Continuous assessment and end of course unit written examination

Continuous Assessment 35%	**Final Assessment** 65%		
Details: Reports 15%, Herbarium specimens 20%	**Theory (%)** 40%	**Practical (%)** 25%	**Other (%)** -

References/Reading Materials:

1. Ashton, P. 2014. *On the Forests of Tropical Asia: Lest the memory fade*. Kew Publishing. UK.
2. Vlas, J. 2008. Illustrated field guide to the flowers of Sri Lanka. Mark booksellers, Kandy.

**Offered for ENCM programme.

Semester	4		
Course Code	BOTA 22573**		
Course Name	**Plant Diversity**		
Credit Value	3		
Core/Optional	Core		
Pre-requisites	ENCM 11512 and ENCM 11522		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	25 hrs	35 hrs	90 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- explain how plants have evolved and phylogenetic relationships amongst diverse groups of plants, and
- demonstrate skills in identifying and distinguishing morphologically different groups of algae, bryophytes, pteridophytes, gymnosperms and angiosperms using their characteristic features.

Course Content:

Classification, origin and evolutionary relationships of autotrophic protists (algae) and plants, green alga as common ancestor of plants. Identification and illustration of morphological features of reproductive and vegetative structures of algae, bryophytes, seedless vascular plants and seed plants. Plants as pioneers of the terrestrial environment. Diversity assessments of lichens and algae using Minitab software package

Teaching/Learning Methods: Lectures, presentations, group assignments, laboratory and field exercises, computer-assisted learning and tutorials

Assessment Strategy: Continuous assessment and end of course unit written and practical examination

Continuous Assessment 30%	**Final Assessment** 70%

Details: Group presentation 30%	**Theory (%)** 45%	**Practical (%)** 25%	**Other (%)** -

References/Reading Materials:

1. Gifford, E.M. and Foster, A.S. 1989. *Morphology and Evolution of Vascular Plants*. W. H. Freeman.
2. Evert, R. F. and Eichhorn, S. E. 2013. *Biology of Plants*. 8th Edition. W.H. Freeman and Company Publishers, New York.
3. Perry, J.W. and Morton, D. 1996. *Photo Atlas for Biology*. Wadsworth.
4. Raven, P., Johnson, G.B., Mason, K.A., Losos, J.B. and Singer, S.S. 2013. *Biology*. McGraw-Hill.

**Offered for ENCM programme.

Semester	5		
Course Code	BOTA 31514		
Course Name	**Ecology and Environmental Resources Management**		
Credit Value	4		
Core/Optional	Core		
Pre-requisite	BOTA 22544		
Co-requisite	BOTA 31522		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	-	140 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate critical analytical skills of ecological interactions, impact of human activities on them and modern technology available to manage environmental resources.

Course Content:

Biosphere: biomes and ecosystems. Ecosystem components: soil formation, properties and biological processes in soil, soils of Sri Lanka. Soil conservation. Plant population ecology, growth characteristics and regulation. Plant community ecology, concept of niche, community composition, patterns in space and time, primary and secondary production, decomposition, energy flow, flux of matter. Tropical rain forest and wetland ecology. Global biogeochemical cycles. Quantitative methods of vegetation analyses: structure assessments and sampling procedures.

Development and environmental degradation, climate change and implications. Principles of environmental management, current practices: protected areas for species/ biodiversity conservation, biomanipulation, ecosystem restoration, Environmental Impact Assessments and Environmental Protection Licensing. Geographical Information Systems (GIS) as a tool for environmental management.

Teaching/Learning Methods: Lectures, computer-assisted learning, lecture guides, audio-visual presentations and tutorials

Assessment Strategy: End of course unit written examination

Continuous Assessment -	**Final Assessment** 100%		
Details: -	**Theory (%)** 100%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Anderson, J.M. 1981. *Ecology for Environmental Science*. Edward Arnold.
2. Cotgreave, P. and Forseth, I. 2002. *Introductory Ecology*. Blackwell Science Ltd.
3. Central Environmental Authority 1995. Man and Environment, CEA, Colombo.
4. Ewusie, J. Y . 1980. *Elements of Tropical Ecology*. Heinemann Educational Books.
5. Lo, C.P. and Yeung, L.K.W. 2002. *Concepts and Techniques of GIS*. Prentice Hall
6. Morgan, R.P.C. 2005. *Soil Erosion and Conservation*. 3rd Edition. Blackwell Science Ltd.
7. Morris, P. (Ed.) 2001. *Methods of Environmental Impact Assessment*. 2nd Edition. Spon Press, London.
8. Osborne, P.L. 2000. *Tropical Ecosystems and Ecological Concepts*. Press Syndicate of the University of Cambridge
9. Krebs, C.J. 1999. *Ecological Methodology*. Addison-Welsy Publishers, USA.
10. Newman, E.I. 2006. *Applied Ecology and Environmental Management*. Blackwell Science Ltd.
11. Schuurman, N. 2006. *GIS: A Short Introduction*.

Semester	5		
Course Code	BOTA 31522		
Course Name	**Ecology and Environmental Resources Management Laboratory**		
Credit Value	2		
Core/Optional	Core		
Pre-requisite	-		
Co-requisite	BOTA 31514		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	-	60 hrs	40 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate skills on gathering, analysis, interpretation and presentation of ecological data and information, required for environmental assessment, describe ecological data using statistics and demonstrate skills on using GIS as a tool in environmental management.

Course Content:
Determination of pH, water status, porosity, organic matter content, cation exchange capacity, PO_4^{3-} and NO_3^- concentration of soil. Identification of species of aquatic, xerophytic, sea shore, salt marsh and mangrove and forest ecosystems of Sri Lanka and their ecological adaptations. Measurement of water quality. Use of quadrat and plotless sampling methods to determine the vegetation structure of grasslands and forests, use of biodiversity and habitat evaluation systems for environmental resources management. Use of GIS in identification of environmental impacts of development activities.

Teaching/Learning Methods: Laboratory and field exercises, presentations, group exercises on GIS application

Assessment Strategy: Continuous assessment, laboratory reports and end of course unit practical examination

Continuous Assessment 10%	**Final Assessment** 90%		
Details: Laboratory reports 5%, Assignment 5%	**Theory (%)** -	**Practical (%)** 90%	**Other (%)** -

References/Reading Materials:

1. Amarasinghe, M. 2001. Laboratory Manual on 'Vegetation Sampling Methods'. Department of Botany, University of Kelaniya.
2. Brower, J.E., Zar, J.H. and Ende, C.N. 1990. *Field and Laboratory Methods for General Ecology*, 4th Edition. NCB McGraw-Hill.
3. Lo, C.P. and Yeung, L.K.W. 2002. *Concepts and Techniques of GIS*. Prentice Hall, New Delhi.
4. Henderson, P.A. 2004. *Practical Methods in Ecology*. Blackwell Science Ltd., UK.

Semester	5		
Course Code	PRPL 31992		
Course Name	**Professional Placement**		
Credit Value	2		
Core/Optional	Optional		
Pre-requisites	-		
Co-requisites	-		
Hourly Breakdown	Theory	Practical	Independent Learning
	-	-	200 hrs

Course Aim/Intended Learning Outcomes:
Upon successful completion of this course unit the student should be able to,

- demonstrate knowledge and understanding of a selected science based area of industrial/ agricultural relevance, and / or concepts of entrepreneurship, and
- develop skills needed in communication, leadership and team working in a multicultural and industrial environment.

Course Content:
Major aspects to be covered are the basic principles of management, underlying concepts of entrepreneurship, generic skills needed to work in the real world of work and knowledge and understanding of a biological resources-based industry.

Teaching /Learning Methods: Training under the supervision and guidance in a relevant industry for six weeks.

Assessment Strategy: Evaluation of the progress report submitted by the trainer and the student's technical report describing the nature of the training and presentations.

Continuous Assessment 30%	Final Assessment 70%		
Details: Trainer's report 30%	Theory (%) -	Practical (%) -	Other (%) Trainee's report 50%, Oral presentation 10%, Diary 10%

References/Reading Materials:
Reading and reference materials recommended/ provided by the relevant industry.

Semester	6		
Course Code	BOTA 32534		
Course Name	**Plant Pathology, Tissue culture and Gene Technology**		
Credit Value	4		
Core/Optional	Optional		
Pre-requisite	BOTA 21513		
Co-requisite	BOTA 32542		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	-	140 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- explain the basic concepts of the mechanisms of compatible and incompatible interactions between plants and microorganisms and describe tissue culture systems and their applications,
- compare and contrast the nuclear and organelle genomes of plants and explain the genetic dependence of chloroplast, and
- explain the basic techniques in recombinant DNA technology and explain how this technology is used for improvement of crop plants.

Course Content:
Plant Pathology: Concepts and symptoms of plant diseases. Pathogens, pathogenesis and disease establishment. Host pathogen interaction: resistance and susceptibility at molecular, cellular and population level. Disease Epidemiology. Fungal, bacterial and viral diseases of local crops and their management.

Gene Technology: Introduction to structure and expression of eukaryotic genes. Nuclear and chloroplast genomes of plants. Chloroplast genes. Introduction to improvement of crop plants. Recombinant DNA technology: Tools (restriction enzymes and cloning vectors) and cloning of plant genes, Ti plasmid and *Agrobacterium* mediated gene transfer into plant cells. Vectors derived from Ti plasmid and transformation of valuable genes into plant cells to generate transgenic plants. Different strategies used in construction of transgenic crops (GM crops) with appropriate examples.

Tissue Culture: Concepts and principles involved in the in vitro culture of plant cells and tissues. Organization of a tissue culture laboratory with emphasis on asepsis. Types of cultures and their practical applications in rapid clonal propagation, crop breeding and disease elimination.

Teaching/Learning Methods: Lectures, tutorials and oral presentations

Assessment Strategy: Continuous assessment and end of course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%

Details: Presentation 15%, Report 15%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Agrios, G.N. 2005. *Plant Pathology*. 5th Edition. Academic Press.
2. නෙළුම් දේශප්‍රිය 2009. ශාක පටක රෝපණය සහ එහි උපයෝගිතා. Biographic Educational Publications.
3. නෙළුම් දේශප්‍රිය 2009. ශාක රෝග: මූල ධර්ම සහ පාලනය. Biographic Educational Publications.
4. Razdan M.K. 2003. *Introduction to Plant Tissue Culture*. Science Publishers Inc. USA.
5. Griffiths, A.J.F., Wessler, S.R, Carroll, S.B. and Doebley, J. 2012. *An Introduction to Genetic Analysis*. 10th Edition. W H Freeman.
6. Lodish, H., Berk, A., Kaiser C.A. and Krieger, M. 2007. *Molecular Cell Biology*. 6th Edition. W.H. Freeman and Co., New York.
7. Dodds, J.H. and Roberts, L.W. 2004. *Experiments in Plant Tissue Culture*. Cambridge University.
8. Lucas, J.A. 1998. *Plant Pathology and Plant Pathogens*. 3rd Edition. Blackwell.
9. Schumann, G.L. and D'Arcy, C. 2009. *Essential Plant Pathology*. 2nd Edition. APS Press.

Semester	6		
Course Code	BOTA 32542		
Course Name	**Plant Pathology, Tissue culture and Gene Technology Laboratory**		
Credit Value	2		
Core/Optional	Optional		
Pre-requisite	-		
Co-requisite	BOTA 32534		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	-	75 hrs	25 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate skills in,

- diagnosis and basic methods of management of plant diseases,
- plant DNA isolation and separation and interpretation of results, and
- *in vitro* culture of plant tissues.

Course Content:

Plant Pathology: Diagnosis and identification of plant pathogens. Confirmation of pathogenicity via Koch's postulates. Methods of plant disease management. Studies on diseases of major crops.

Gene Technology: Isolation of genomic DNA from plant cells. Quantification of nucleic acids. Electrophoresis of DNA. Analysis of electrophoretic data and construction of restriction maps.

Tissue Culture: Techniques used in the in vitro culture of plant tissues and organs.

Teaching/Learning Methods: Laboratory exercises, oral presentations and field visits

Assessment Strategy: Continuous assessment, laboratory reports and end of course unit practical examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Laboratory reports 10%, Report 10%, Presentation 10%	**Theory (%)** -	**Practical (%)** 70%	**Other (%)** -

References/Reading Materials:

1. Waller, J.M., Ritchie, B.J. and Holderness, M. 1998. *Plant Clinic Hand Book*. CAB International.
2. Reinert, J. and Yeoman, M.M. 1982. Plant Cell and Tissue Culture - A Laboratory Manual. Springer-Verlag.
3. Dodds, J.H. and Roberts, L.W. 2004. *Experiments in Plant Tissue Culture*. Cambridge University.
4. Sambrook, J., Fritshm E.F. and Maniatis, T. 1989. *Molecular Cloning. A Laboratory Manual*. 2nd Edition. Cold Spring Harbour Laboratory.

Semester	6		
Course Code	BOTA 32554		
Course Name	**Horticulture and Post-harvest Biology**		
Credit Value	4		
Core/Optional	Optional		
Pre-requisite	BOTA 21513		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	45 hrs	125 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- demonstrate skills required in modern horticultural and landscaping practices, and
- explain concepts of postharvest biology and technology to minimize post-harvest loss of fruits and vegetables.

Course Content:

Horticulture - Horticulture production: irrigation, soil factors, fertilizer applications, Seed characteristics and transplanting methods, Vegetative and in vitro propagation, landscape maintenance, Crop breeding, diagnosing and treating plant disorders/ diseases, Growing plants indoors, Hydroponic cultivation methods and cultivation of mushrooms, Post-harvest Biology - Post-harvest physiology of fresh produce, Harvesting and handling practices, Cold storage of fruits/ vegetables, Packaging technologies and packhouse operations, Post-harvest diseases and their mode of infection, Minimal processing of fruits and vegetables.

Teaching/Learning Methods: Lectures, laboratory and field exercises, presentations, field visits, model preparation and computer assisted learning

Assessment Strategy: Continuous assessment, field evaluation, end of course unit practical and written examination

Continuous Assessment 35%	**Final Assessment** 65%		
Details: Laboratory reports 20%, Assignment reports 15%	**Theory (%)** 40%	**Practical (%)** 25%	**Other (%)** -

References/Reading Materials:

1. Abeywickrama, K. 2006. Pictorial guide to rapid and accurate identification of post-harvest diseases in fruits. Godage International Publishers.
2. Acquaah, G. 2009. *Horticulture: Principles and practices*. PHI Learning (Pvt. Ltd), New Delhi.
3. Wills, R.B.H., McGlasson, W.B., Graham, D. and Joyce D.C. 2007. *Postharvest: An introduction to the physiology and handling of fruits, vegetables and ornamentals*. 5th edition. CAB International.

Note: Students are permitted to select either BOTA 32534 & BOTA 32542 or BOTA 32554.

Semester	5		
Course Code	BOTA 41766		
Course Name	**Plant Systematics and Bioinformatics**		
Credit Value	6		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	30 hrs	210 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- recognize different taxonomic sources,
- analyze taxonomic information, construct phylogenetic tress with molecular data sets and interpret relationships,
- explain principles of PCR, primer design, molecular markers and genotyping, and
- develop skills in collection of herbarium specimens.

Course Content:

Classification of Angiosperms, Angiosperm Phylogeny Group (APG). Numerical taxonomy: cluster analysis, phenetics

and cladistics, definitions and concepts, character selection, symplesiomorphies and synapormorphies, parsimony method. Introduction to bioinformatics, definitions, application of computer methods in bioinformation, Sources of taxonomic information: structural, chemical, chromosomal, geographical and ecological information. Evolution, variation and biosystematics. Plant nomenclature: type specimens, author citations, rule of priority. Presentation of data: monographs, Floras and revisions. Taxonomic databases. Herbarium techniques, Use and construction of identification keys.

Introduction to molecular markers, PCR, nucleotide polymorphisms, DNA barcoding, BLAST, pairwise alignment, importance of data visualization methods, phylogenetic tree construction methods, tree thinking, pros and cons of each method, bootstrapping, edit a DNA sequence, principles of multiple sequence alignments, align multiple sequences for phylogenetic analysis, use computer software for sequence alignments, editing, and phylogenetic tree construction, interpret data.

Teaching/Learning Methods: Lectures, tutorials, presentations, field exercises, practical assignments, and group projects

Assessment Strategy: Presentations, assignment reports, assessment of herbarium specimens & project reports and end of course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Presentations 10%, Felid studies 10%, Assignment reports 10%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Judd, W.S., Campbell, C.S., Kellog, E.A., Stevens, P.F. and Donoghue, M.J. 2007. *Plant Systematics: A Phylogenetic Approach*. Sinauer Associates, Inc.,
2. Stace, C.A. 1989. *Plant Taxonomy and Biosystematics*. Cambridge.
3. Forman, L. and Bridson, D., (eds) 1989. *The Herbarium Handbook*. Royal Botanic Gardens, Kew.
4. Podani, J. 2000. *Introduction to the Exploration of Multivariate Biological Data*. Backhuys Publishers.
5. Manly, B.F.J. 2004. *Multivariate Statistical Methods*. A Primer London.
6. Zvelebil, M., and Baum, J.O. 2007. *Understanding bioinformatics*, 1st edition. Garland Science NY.

Semester	6		
Course Code	BOTA 42776		
Course Name	**Plant Physiology and Biochemistry**		
Credit Value	6		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	30 hrs	210 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- explain certain physiological/biochemical concepts and phenomena,
- discuss the physiological changes that take place in extreme environments,
- discuss the molecular biology of plant nutrient relation, and
- explain the concept of metabolic regulation.

Course Content:

Water relations; soil-plant-atmosphere continuum. Stress physiology: stress concepts, water, salt, solar radiation and temperature stress, nutrient acquisition from toxic or extreme soils. Photosynthesis: photochemistry, mechanisms of light absorption and emission, photophosphorylation and chemiosmotic coupling hypothesis, prokaryotic photosynthesis, carbon isotope fractionation and water use efficiency. Photomorphogenesis. Physiological genetics and molecular biology. Metabolism: metabolic fuel and regulation. Lipid metabolism and regulation: □ oxidation, fatty acid synthesis. Pathways and regulation of gluconeogenesis, pentose phosphate pathway, cyanide-resistant respiration. Secondary metabolites and plant defense. Enzymology: enzyme kinetics, isozymes, isoforms of enzymes, allosteric enzymes and regulation of enzyme activity.

Teaching/Learning Methods: Lectures, seminars, computer-assisted learning, tutorials and practical assignments			
Assessment Strategy: Assignment reports and individual viva and end of course unit written examination			
Continuous Assessment 35%	**Final Assessment** 65%		
Details: Practical assignment and *viva voce* 35%	**Theory (%)** 65%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Salisbury, F.B. and Ross, C.W. 1992. *Plant Physiology*. 4th edition. Wadsworth, California.
2. Taiz, L. and Zeiger, E. 2010. *Plant Physiology*, 5th edition. Sinauer Associates, Inc., Masshachusetts.
3. Lambers, H., Chapin, F.S. and Pons, T.L. 2008. *Plant Physiology Ecology*. 2nd edition. Springer Publishers, New York.
4. Moran, L.A., Horton, H.R., Scrimgeour, K.G. and Perry, M.D. 2012. *Principles of Biochemistry*. Pearson Education, Inc., Illinois.
5. Lehninger, L., Nelson, D.L. and Cox, M.M. 2000. *Principles of Biochemistry*. Worth, California.

Semester	7		
Course Code	BOTA 41784		
Course Name	**Plant Pathology**		
Credit Value	4		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	60 hrs	15 hrs	125 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- explain the principles involved in conventional and modern methods of plant disease diagnosis,
- explain the intricacies of the compatible and incompatible interactions between plants and pathogenic microorganisms, and
- outline methodologies for using bio control agents and quarantine practices for the management of plant diseases.

Course Content:

Diagnostic techniques in plant diseases: use of symptoms, biochemical, physiological, ultra-structural, Immunological and nucleic acid based methods in disease diagnosis. Infection and pathogenesis: molecular basis of adhesion and penetration by bacterial and fungal pathogens. Pathogenicity determinants. Constitutive and induced defense in plants including the molecular basis of elicitation, signaling and the mechanisms involved. Hrp and avr genes. Soil-borne pathogens in the tropics and their control. Post harvest diseases of local fresh produce and their management. Effect of viruses and insect pests on plant health. Vascular wilt pathogens and their pathogenesis. Disease management using bio-control agents. Quarantine practices in the management of plant pathogens.

Teaching/Learning Methods: Lectures, presentations and visits to research institutes			
Assessment Strategy: Assignment reports and end of course unit written examination			
Continuous Assessment 40%	**Final Assessment** 60%		
Details: Review article 13.33%, Report 13.33%, Presentation 13.33%	**Theory (%)** 60%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Beckman, C.H. 1987. *The Nature of Wilt Diseases of Plants*. The American Phytopathological Society. USA.
2. Vidhysekaran, P. 2008. *Fungal Pathogenesis in Plants and Crops-Molecular Biology and Host Defense Mechanisms*. Marcel Dekker. New York.
3. Dehne, H.W., Adan, G., Diekmann, M., Frahm, J., Mauler-Machnik, A. and Van, H.P. 1997. *Diagnosis and Identification of Plant Pathogens*. Kluwer Academic.

4. Sigee, D.C. 2005. *Bacterial Plant Pathology: Cell and Molecular Aspects*. SMI.
5. Dickinson, M. 2003. *Molecular Plant Pathology*. Blackwell.
6. Jeger, M.J. 2007. *Biotic interactions in Plant Pathogen Associations*. Blackwell.
7. Relevant articles in Annual Review of Phytopathology and any other relevant journal.

Semester	7		
Course Code	BOTA 41793		
Course Name	**Applied Microbiology**		
Credit Value	3		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	15 hrs	105 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- distinguish between the food-borne intoxications and food infections,
- describe principles of food preservation and aseptic procedures adopted in industrial food production, and
- compare the effectiveness of various groups of antibiotics in the management of diseases.

Course Content:
Microbial spoilage of food, food-borne intoxications and food infections. Principles and processes of food preservation. Microbial standards and quality control of foods. Industrial microbiology: use of microbial processes and technology in the production of beverages, perishable foods and pharmaceuticals. Water treatment: industrial and domestic systems, sewage disposal. Antibiotics: clinical use of antibiotics, mechanism of action of antibiotics and drug resistance.

Teaching/Learning Methods: Lectures, seminars and industry visits

Assessment Strategy: Continuous assessment, presentations and end of course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Assignments 30%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. James M. J., Loessner, M.J. and Golden, D.A. 2013. *Modern Food Microbiology*. 7th Edition. Springer Science + Business Media Inc.
2. Sergio Sánchez and Arnold L. Demain (Eds.) 2015. *Antibiotics: Current Innovations and Future Trends*. Caister Academic Press, United Kingdom.
3. Komacki, Jeffrey (Ed.) 2009. *Principles of Microbiological Troubleshooting in the Industrial Food Processing Environment (Food Microbiology and Food Safety)*. Springer Publishers.

Semester	7		
Course Code	BOTA 41803		
Course Name	**Economic Botany**		
Credit Value	3		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	15 hrs	105 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to describe botanical aspects of economically important plants, post harvest practices of grains, fruits and vegetables and potential of plant-

based industries.

Course Content:
Botany of economically important plants, domestication of crops, bio geography of selected crop plants. Post harvest practices; storage, pack house operations and packaging, post harvest losses, effect of preharvest and postharvest factors on the quality and shelf life of commodity. Bioprospecting: Plant- based industries: Pharmaceuticals, food and beverages, cosmetics, insecticides and pesticides.

Teaching/Learning Methods: Lectures, tutorials, practical assignments, group projects, presentations and visits to research institutes

Assessment Strategy: Assignment and project reports, presentations and end of course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Assignments 30%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Simpson, B.B. and Ogorzaly, M.C. 2000. *Economic Botany*. McGraw-Hill.
2. Hill, A.F. 1972. *Economic Botany. A Text Book of Useful Plants and Plant Products*. McGraw Hill.
3. Kaufman, P.B., Cseke, L.J., Warber, S., Duke, J.A. and Brielmann, H.L. 1999. *Natural Products from Plants*. CRC Press, London.
4. Wills, R.B.H., McGlasson, W.B., Graham, D. and Joyce D.C. 2007. *Postharvest: An introduction to the physiology and handling of fruits, vegetables and ornamentals*. 5th ed. CAB International.
5. Cooke, T., Persley, D. and House, S. 2009. *Diseases of Fruit Crops in Australia*, Department of Primary Industries, Queensland, Australia.

Semester	7		
Course Code	BOTA 41813		
Course Name	**Plant Breeding**		
Credit Value	3		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	15 hrs	105 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to describe,
- pollination mechanisms of plants with underlying principles,
- methods in plant breeding, and
- natural pollination control mechanisms in plant breeding.

Course Content:
Cytogenetics. Pollination syndromes. Floral biology in relation to pollination. Mating systems of plants, male sterility, and self-incompatibility. Genetic aspects of plant breeding. Plant breeding methods and their objectives. Breeding methods for cross pollinating and self-pollinating crop plants. Applications of molecular techniques in plant breeding.

Teaching/Learning Methods: Lectures, tutorials, practical assignments, field based exercises, and group presentations.

Assessment Strategy: Assignment reports, presentations and end of course unit written examination

Continuous Assessment 35%	**Final Assessment** 65%		
Details: Reports 15%, Assignments 20%	**Theory (%)** 65%	**Practical (%)** -	**Other (%)** –

References/Reading Materials:

1. Acquaah, G. 2007. *Principles of Plant Genetics and Breeding*. Blackwell Publishing.

2. Bernardo, R. 2014. *Essentials of Plant Breeding. Stemma Press*, Woodbury, Minnesota. ISBN 978-0-9720724-2-7.
3. Bernardo, R. 2014. *Breeding for quantitative traits in plants*. Stemma Press, Woodbury, Minnesota.

Semester	7		
Course Code	BOTA 41823		
Course Name	**Forest Management and Soil Nutrient Dynamics**		
Credit Value	3		
Core/Optional	Core		
Pre-requisite	All BOTA compulsory course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	20 hrs	100 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to,

- critically discuss the procedures and methodologies of forestry practices,
- evaluate the utility of forest products, and conservation of forest resources, and
- discuss the process of nutrient cycling in terrestrial ecosystems with emphasis on the role of fungi and bacteria and the methods for studying processes involved in nutrient cycling.

Course Content:
Status of forests in Asia. Forestry policy, principles of sustainable forestry and current forestry practices in Sri Lanka. Ecological disturbance, natural regeneration, restoration of degraded ecosystems. Principles of silvicultural management. Seed biology, nursery growth and harvesting. Agroforestry, community forestry. Non-wood forest products, timber and timber processing. Forestry-associated environmental impacts. Conservation strategies of selected plants. Litter input, accumulation and organic matter turnover in relation to the role of fungi and bacteria in the decomposition processes in forest ecosystems. Life supporting ecological interactions in soil, and methods of studying nutrient cycling. Impact of anthropogenic activities on soil quality, microbial community and decomposition process. Effects of forest fire on soil physico-chemical and biological properties.

Teaching/Learning Methods: Lectures, tutorials, field assignments, assignments and computer assisted learning

Assessment Strategy: Continuous assessment and end of course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Reports 30%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Richards, P.W. 1996. *The Tropical Rain Forest*, 2nd edition. Cambridge University Press, Cambridge.
2. Whitmore, T.C. 1998. *An Introduction to Tropical Rain Forests*. Oxford University Press, New York.
3. Poffenberger, M. (ed.) 2000. *Communities and Forest Management in South Asia*, IUCN, Switzerland.
4. Schinner F., Öhlinger, R., Kandeler, E. and Margesin, R. 1996. *Methods in Soil Biology*. Springer-Verlag, Berlin.
5. Metting, F.B. 1993. *Soil Microbial Ecology*. Marcel Dekker, New York.

Semesters	7 and 8		
Course Code	BOTA 43838		
Course Name	**Research Project**		
Credit Value	8		
Core/Optional	Core		
Pre-requisite	All compulsory BOTA course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	-	-	800 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate

competence in,

- planning and carrying out a research project scientifically,
- presenting the research in the form of a dissertation, and
- defending the work carried out and outcomes.

Course Content: Research project related to sub discipline(s) of Botany

Teaching/Learning Methods: A one year research project is assigned to each student under the supervision of a senior academic staff member at the beginning of level four. Before commencement of the research, research plan and methodology of the project should be presented at a seminar. A dissertation should be submitted before the end of the academic year. Presentation of the research findings at a seminar will be evaluated by board examiners.

Assessment Strategy: Dissertation and oral presentation

Continuous Assessment -	**Final Assessment** 100%		
Details: -	**Theory (%)** -	**Practical (%)** -	**Other (%)** Dissertation 70%, Oral presentation 30%

References/Reading Materials:

1. Day, R.A. 1994. *How to Write and Publish a Scientific Paper*. Orix.
2. Alley, M. 1998. *The Craft of Scientific Writing*. Springer Verlag.
3. Reference material relevant to each research topic prescribed by the relevant supervisor

Semesters	6 and 7		
Course Code	BOTA 43842		
Course Name	**Term Paper**		
Credit Value	2		
Core/Optional	Core		
Pre-requisite	All compulsory BOTA course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	05 hrs	-	95 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to demonstrate the ability for critical, self-directed learning, and skills in oral and written communication.

Course Content:
Two written papers on topics related to sub disciplines of Botany.

Teaching/Learning Methods: Survey of literature related to a prescribed topic and subsequent presentation in written and oral form.

Assessment Strategy: Written paper and oral presentations

Continuous Assessment 50%	**Final Assessment** 50%		
Details: Written paper 50%	**Theory (%)** -	**Practical (%)** -	**Other (%)** Oral presentation 50%

References/Reading Materials:
Prescribed by the lecturer in-charge of each term paper

Semester	8			
Course Code	BOTA 42853			
Course Name	**Ecology of Sustainability**			
Credit Value	3			
Core/Optional	Core			
Pre-requisite	All compulsory BOTA course units and BOTA 32534			
Co-requisite	-			
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**	
	30 hrs	15 hrs	105 hrs	
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to analysis of ecological patterns and proposing sustainable solutions for ecological and developmental issues.				
Course Content: Life-supporting ecological interactions, functions and services, physical and functional structure of ecosystems, their measurement, factors affecting food web structure and community/ ecosystem stability, plant diversity within areas, alpha, beta and gamma diversity, keystone species, functional diversity, magnitude and assessment of plant diversity, Optimizing material usage and minimizing ecological impact of human activities to levels that natural systems can sustain (Green revolution vs. "ecological farming'), industrial designs as living systems interdependent with nature, fundamentals of 'Ecological Foot Printing".				
Teaching/Learning Methods: Lectures, field visits, practical assignments and CAL				
Assessment Strategy: Assignment reports and end of the course unit written examination				
Continuous Assessment 10%		**Final Assessment** 90%		
Details: Assignment reports 10%		**Theory (%)** 70%	**Practical (%)** 20%	**Other (%)** -
References/Reading Materials: 1. Bormann, F.H. and Kellert, S.R. 1991. *Ecology, Economics and Ethics*. Yale University. 2. Heywood, V.H. (ed) 1995. *Global Biodiversity Assessment*. UNEP. 3. Begon, M., Herper, J.L. and Townsend, C.R. 1990. *Ecology*, 3rd Edition, Blackwell Science. 4. Chambers, N., Simmons, C. and Wackernagel, M. 2000. *Sharing Nature's Interest*. Earthscan Publishers Ltd. 5. Snedaker, S.C. and Snedaker, J.G. 1984. *Mangrove Ecosystem: Research Methods*. UNESCO, Paris. 6. National Science Foundation, 2000. Natural Resources of Sri Lanka. 7. Osborne, P.L., 2000. *Tropical Ecosystems and Ecological Concepts*. Press Syndicate of the University of Cambridge, UK. 8. Krebs, C.J. 1999. *Ecological Methodology*. Addison-Welsy Publishers, USA.				

Semester	8		
Course Code	BOTA 42864		
Course Name	**Molecular and Microbial Genetics**		
Credit Value	4		
Core/Optional	Core		
Pre-requisite	All compulsory BOTA course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	45 hrs	15 hrs	140 hrs
Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to, ➢ explain the organization of prokaryotic and eukaryotic genomes, ➢ compare and contrast basic processes of prokaryotic and eukaryotic gene expression, and ➢ describe the tools and basic techniques in recombinant DNA technology, and develop skills in analyzing the genetic engineering approaches used in construction of transgenic plants.			

Course Content:
Structure and organization of eukaryotic chromosomes. Eukaryotic gene expression (transcription and RNA processing). Molecular basis of transformation and conjugation. Use of conjugation for strain construction and genome mapping. Transcriptional regulation in bacteria.

Life cycles of bacteriophages, Genetic regulation in bacteriophage Lambda. General and specialized transduction. DNA damage and repair mechanisms in bacteria. Transposable elements. Use of microbial genetic components in construction of cloning vectors and their applications in recombinant DNA technology. Transformation of foreign genes into plant cells and construction of transgenic plants. Other techniques and applications in plant genetic engineering.

Teaching/Learning Methods: Assignments, lectures and tutorials

Assessment Strategy: Assignment reports, presentations and end of course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Assignments 30%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Krebs, J.E., Goldstein, E.S. and Kilpatrick, S.T. and Lewin, B. 2014. *Lewin's Genes XI*. 11th edition. Jones & Bartlett Learning.
2. Griffiths, A.J.F., Wessler, S.R., Carroll, S.B. and Doebley, J. 2012. *An Introduction to Genetic Analysis*. 10th Edition. W H Freeman.
3. Green, M.R. and Sambrook, J. 2014. *Molecular Cloning: A Laboratory Manual.* 4th edition. Cold Spring Harbor Laboratory Press.
4. Lodish, H., Berk, A., Kaiser, C.A. and Krieger, M. 2007. *Molecular Cell Biology*. 6th edition. W.H. Freeman and Co., New York.

Semester	8		
Course Code	BOTA 42873		
Course Name	**Fungal Ecophysiology and Applied Mycology**		
Credit Value	3		
Core/Optional	Core		
Pre-requisite	All compulsory BOTA course units and BOTA 32534		
Co-requisite	-		
Hourly Breakdown	**Theory**	**Practical**	**Independent Learning**
	30 hrs	45 hrs	75 hrs

Course Aim/Intended Learning Outcomes: At the completion of this course student will be able to explain the principles of fungal growth, metabolism and their ecophysiological interactions in relation to their economic use.

Course Content:
Fungal growth. Nutrient requirement and modes of nutrition. Metabolism. Tolerance of fungi to extreme environments. Environmental factors affecting fungal diversity. Fungal conservation. Fungal interactions and their application in pest and weed management, improvement of forest plantations and crop cultivations. Industrial use of fungi. Fungicides

Teaching/Learning Methods: Lectures, assignments and presentations

Assessment Strategy: Assignment reports and end of the course unit written examination

Continuous Assessment 30%	**Final Assessment** 70%		
Details: Laboratory reports 30%	**Theory (%)** 70%	**Practical (%)** -	**Other (%)** -

References/Reading Materials:

1. Esser, K. and Lemke, P.A. 1994. *The Mycota*. Springer-Verlag, New York.
2. Hawksworth, D.L. 1990. *Frontiers in Mycology*. C A B International, UK.
3. Kendrick, B. 1992. *The Fifth Kingdom*. 2nd edition, Mycologue Publications; Focus Information Group.
4. Landecker, E.M. 1996. *Fundamentals of the Fungi*. Prentice Hall, New Jersey.
5. Deacon, J. 2004. *Fungal Biology*. 4th Edition. Blackwell Science.