

MODULE DESCRIPTOR

MODULE TITLE	Tree Biology		
MODULE CODE	MR1016	CREDIT VALUE	20 Credits
MODULE DELIVERY	Year Long (Full Time) or Single Semester (Online)		
MODULE TUTOR	Andrew Hirons		
DATE APPROVED	19 May 03, 30 June 05, 5 September 05, April 2008	VERSION NUMBER	4
DEPARTMENT	School of Built & Natural Environment	PARTNER INSTITUTION	Myerscough College

RELATIONSHIP WITH OTHER MODULES

Co-requisites	None	Pre-requisites	None	Excluded Combinations	None
----------------------	------	-----------------------	------	------------------------------	------

MODULE AIMS

This module aims to develop thorough knowledge of tree growth and development, tree morphology and anatomy and tree adaptation to a range of environmental conditions. The module will explore the relationship between trees and a range of organisms (eg. mammals, insects, fungi, bacteria) and allow students to apply sound biological knowledge to cultural and management practices.

MODULE CONTENT

- 1 Tree Growth & Development**
 - 1.1 Primary growth
 - 1.2 Secondary Growth
 - 1.3 Indeterminate and determinate growth patterns
 - 1.4 Sympodial and monopodial growth
 - 1.5 Fixed and free growth
 - 1.6 Reaction growth
 - 1.6 Root growth
 - 1.7 Tree nutrition
- 2 Tree Form**
 - 2.1 Excurrent and Decurrent form
 - 2.2 Monolayer and Multilayer canopies
 - 2.3 Woodland and Open grown trees
 - 2.4 Arboreal root morphology and architecture
- 3 Tree Anatomy**
 - 3.1 Wood anatomy; Ring porous, Diffuse porous, Non-porous
 - 3.2 Leaf anatomy; Sun and Shade leaves
 - 3.3 Branch attachment
- 4 Ecophysiology of Trees**
 - 4.1 Tree adaptation to specific environments
 - 4.2 Tree response to environmental stress
- 5 Whole Tree Concepts**
 - 5.1 Tree water relations
 - 5.2 Tree energy concepts
 - 5.3 Tree carbohydrates

6	Interactions With Other Organisms
6.1	Symbiotic relationships
6.2	Compartmentalisation Of Dysfunction In Trees
6.3	Tree defence

LEARNING OUTCOMES

On successful completion of this module a student will be able to:

1	Describe tree growth processes
2	Distinguish between a range of tree forms and growth patterns
3	Identify principle anatomical features in woody angiosperms and gymnosperms
4	Explain how trees have adapted to survive in specific environments
5	Outline the relationship trees share with a range of organisms
6	Describe how a knowledge of tree biology contributes towards current arboricultural practice

TEACHING AND LEARNING STRATEGY

Full Time

A series of lectures and seminars will provide essential module information. This will be supported by practical exercises, group learning activities and individual project work. Core academic skills will be developed through the use of subject specific literature, student led presentations and guided tasks. A virtual learning environment will also provide a range of additional lecture notes, relevant literature, self assessment activities, and links to online resources. The diversity of teaching approaches combined with individual study will ensure all module aims are achieved.

Online

A virtual learning environment provides a platform to distribute a series of documents providing principle subject knowledge. Further reading from a range of sources supplements core information and contributes towards the achievement of all module aims. Self assessment activities facilitate formative assessment throughout the class and can offer instant feedback on learning. Regular synchronised online events using video conferencing software is used to simulate an authentic classroom experience to students in a distributed environment. Student interaction and debate is encouraged through a subject specific discussion board and individual support is available via email and telephone.

INDICATIVE CLASS CONTACT

Lecture 2 hrs per week.

For on-line distance learning, module tutor time equivalent to 3 hours per week for one semester is allocated to support students. On-line students also have 24 hour access to a wide range of on-line learning materials and learning activities.

INDICATIVE ASSESSMENT

Number of Assignments	Assessment	Weighting %	Type/Duration/ Wordcount (indicative only)	Learning Outcomes being assessed
1	Tree strategies and environmental stress.	50%	Students will design a poster (1000wds) with supporting academic essay (2000wds) on the strategies used by trees in specific environments.	2, 3, 4
1	End of module exam	50%	2 hour examination	1, 5, 6

MODULE PASS REQUIREMENTS

For successful completion of this module, each individual element of assessment must be passed at 40%.

BIBLIOGRAPHY AND LEARNING SUPPORT MATERIAL

- Bernatzky, A. (1978) *Tree Ecology and Preservation*. Amsterdam: Elsevier
- Beck, C. (2005) *An Introduction to Plant Structure and Development*. Cambridge University Press
- Blanchette, R.A. and Biggs, A.R. (Eds) (1992) *Defense Mechanisms of Woody Plants Against Fungi*. Springer Series in Wood Science. Springer-Verlag (Berlin)
- Gilman, E. (2001) *An Illustrated Guide to Pruning*. Delmar Thomson Learning. Also available as an ebook on www.ebrary.com
- Harris, R.W. Clark, J.R. and Matheny, N.P. (2003) *Arboriculture 4th Edition, Integrated Management of Trees, Shrubs and Vines*. Prentice Hall.
- Hillis, W.E. (1987) *Heartwood and Tree Exudates*. Springer Series in Wood Science. Springer-Verlag (Berlin)
- Horn, H.S. (1971) *The Adaptive Geometry of Trees*, Monographs in Population Biology 3. Princeton University Press.
- Kozlowski, T.T. Kramer, P.J. and Pallardy, S.G. (1991) *Physiological Ecology of Woody Plants* San Diego, London: Academic Press
- Kozlowski, T.T. and Pallardy, S.G. (1997) *Growth Control in Woody Plants* San Diego, London: Academic Press
- Kramer, P.J. & Kozlowski, T.T. (1997) *Physiology of Woody Plants 2nd Edition*. San Diego, London: Academic Press
- Mauseth, J.D. *Botany; An Introduction to Plant Biology 3rd Edition*. Jones and Bartlett Publishers. Sudbury Massachusetts.
- Pallardy, S.G. (2008) *Physiology of Woody Plants 3rd Edition*. San Diego, London: Academic Press *
- Schoch, W. Heller, I. Schweingruber, F.H. and Kienast, F. (2004) *Wood Anatomy of Central European Species*. Online version: www.woodanatomy.ch
- Schwarze, F.W.M.R. Engels, E. Mattheck, C. (2000) *Fungal Strategies of Decay in Trees*. Springer-Verlag: Berlin
- Schweingruber, F.H. Borner, A. Schulze, E.D (2006) *Atlas of Woody Plant Stems; Evolution, Structure and Environmental Modifications*. Springer-Verlag: Berlin
- Shigo, A.L. (1991) *Modern Arboriculture*. Durham, US: Shigo and Trees Associates

Shigo, A.L. (1994) *Tree Anatomy*. Durham, US: Shigo and Trees Associates

Sinclair, W.A. and Lyon, H.H. (2005) *Diseases of Trees and Shrubs 2nd Edition*. Comstock Publishing Associates. Cornell University Press

Taiz, L. & Zeiger, E. (2006) *Plant Physiology* 4th Edition. Sinauer Associates Inc. Additional resources available at www.plantphys.net

Thomas, P. (2000) *Trees: Their Natural History*. Cambridge University Press. Also available as an ebook on www.ebrary.com

Tyree, M.T. & Zimmermann, M.H. (2002) *Xylem Structure and the Ascent of Sap*. 2nd Edition. Springer-Verlag

Wilson, B.F. (1984) *The Growing Tree, revised edition*. The University of Massachusetts Press.

Zimmerman, M. & Brown, C.L. (1971) *Trees: Structure and Function*. New York: Springer-Verlag

* Module recommended textbook