

BS358-15 Biological Clocks

24/25

Department

Life Sciences

Level

Undergraduate Level 3

Module leader

Isabelle Carre

Credit value

15

Module duration

10 weeks

Assessment

Multiple

Study location

University of Warwick main campus, Coventry

Description

Introductory description

This final year module allows the students to bring their extensive background in molecular biology to bear on a complex and wide ranging topic which crosses phylum boundaries, is largely new to them, and which is one of the department's areas of research expertise

Module aims

The module begins with the molecular mechanisms of the circadian system and moves on to clock-regulated processes in whole organisms, including their interactions with the environment and seasonality. Emphasis of the course is placed on understanding how research progresses. Lectures alternate with workshops in which students discuss landmark papers in the field. Students are exposed to a broad range of research approaches and experimental techniques and learn to interpret a variety of data types

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

1 Isabelle Carre Introduction. General properties of circadian clocks; adaptive significance; human chronotypes

- 2 Isabelle Carre Identification of clock genes.
- 3 Isabelle Carre Molecular mechanisms
- 4 Isabelle Carre Research paper analysis
- 5 Isabelle Carre Anatomical location of clocks. Hierarchical organisation of circadian oscillators in animals
- 6 Isabelle Carre input and output from the circadian clock
- 7 Isabelle Carre Research paper analysis
- 8 R Dallmann The interplay between the circadian clock and metabolism
- 9 R Dallmann Impact of circadian disruption on human health
- 10 R Dallmann Chronopharmacology
- 11 R Dallmann Research paper analysis
- 12 Isabelle Carre How circadian rhythms contribute to plant fitness.
- 13 Isabelle Carre Seasonal responses in plants and animals
- 14 Isabelle Carre Seasonal responses in plants and animals
- 15 Isabelle Carre Research paper analysis

Learning outcomes

By the end of the module, students should be able to:

- LO1 Students should develop a better appreciation of the importance of temporal organization in Biology
- LO2 From the recent research on the molecular mechanisms of circadian rhythms, they should become familiar with the current picture of biological pacemakers in several organisms.
- LO3 Students will learn to interpret different types of research data and to formulate their own independent conclusions

Indicative reading list

"Rhythms of life. The biological clocks that control the daily life of every living thing" by Russel Foster and Leon Kreitzman. Profile Books. 2004. ISBN 186-197-235-0

Chronobiology: biological timekeeping. Edited by J. C. Dunlap, J. J. Loros and P. J. DeCoursey. W. H. Freeman. Sinauer associates. 2004. ISBN 0-87893-149-X

Young, M. W. and Kay, S. A. (2001) Time zones: a comparative genetics of circadian clocks. Nature Reviews Genetics 2: 702-715

Subject specific skills

- a. Demonstrate clear understanding of the scientific topic
- b. Contain evidence of extended reading and lateral integration of material not covered in the lectures
- c. Demonstrate independent thought and deep understanding
- d. Specifically answer the set question using information from multiple lectures and sources
- e. Be structured and formatted in a way that demonstrates understanding and logical flow
- f. Use multiple sources to construct complex scientific arguments and integrating these to build and develop the student's own scientific conclusions.

g. Use of quantitative skills to analyse and interpret published scientific data

Transferable skills

1. Critical appraisal of source material
 2. Self directed learning
 3. Adult learning
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Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (11%)
Private study	130 hours (68%)
Assessment	40 hours (21%)
Total	190 hours

Private study description

90 hrs of self-study and directed reading to prepare for open book assessments

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Assessment group A2

	Weighting	Study time
literature based assessment	50%	20 hours
Students will write a 1000-word News & Views article based on a recent publication in the field. They will provide a critical evaluation of the research and will explain how the work represents a significant advance in the field. Students will be given the choice of two topics.		
Online test	50%	20 hours
This 2-hour online test will assess critical understanding and analysis of a contemporary scientific paper, using skills developed in paper discussion workshops.		

Assessment group R1

	Weighting	Study time
Module reassessment	100%	
One peer-reviewed literature based element and one online test.		

Feedback on assessment

Individual written feedback.

Availability

Courses

This module is Core optional for:

- UIPA-C1L8 Undergraduate Life Sciences and Global Sustainable Development
 - Year 3 of C1L8 Life Sciences and Global Sustainable Development
 - Year 3 of C1LB Life Sciences and Global Sustainable Development: Ecology
- UIPA-C1L9 Undergraduate Life Sciences and Global Sustainable Development (with Intercalated Year)
 - Year 4 of C1L9 Life Sciences and Global Sustainable Development (with Intercalated Year)
 - Year 4 of C1LD Life Sciences and Global Sustainable Development: Ecology (with Intercalated Year)

This module is Optional for:

- Year 3 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
 - Year 3 of C1A2 Biochemistry
 - Year 3 of C700 Biochemistry
- Year 4 of ULFA-C702 Undergraduate Biochemistry (with Placement Year)
- Year 3 of ULFA-C1A6 Undergraduate Biochemistry with Industrial Placement (MBio)
- UBSA-3 Undergraduate Biological Sciences
 - Year 3 of C100 Biological Sciences
 - Year 3 of C100 Biological Sciences
- Year 3 of ULFA-C1A1 Undergraduate Biological Sciences (MBio)
- Year 4 of ULFA-C113 Undergraduate Biological Sciences (with Placement Year)
- Year 3 of ULFA-C1A5 Undergraduate Biological Sciences with Industrial Placement (MBio)
- UBSA-C1B9 Undergraduate Biomedical Science
 - Year 3 of C1B9 Biomedical Science
 - Year 3 of C1B9 Biomedical Science

- Year 3 of C1B9 Biomedical Science
- ULFA-C1A3 Undergraduate Biomedical Science (MBio)
 - Year 3 of C1A3 Biomedical Science
 - Year 3 of C1B9 Biomedical Science
- Year 3 of ULFA-C1A7 Undergraduate Biomedical Science with Industrial Placement (MBio)
- ULFA-CB18 Undergraduate Biomedical Science with Placement Year
 - Year 4 of CB18 Biomedical Science with Placement Year
 - Year 4 of CB18 Biomedical Science with Placement Year
 - Year 4 of CB18 Biomedical Science with Placement Year
- Year 3 of ULFA-B140 Undergraduate Neuroscience (BSc)
- Year 3 of ULFA-B142 Undergraduate Neuroscience (MBio)
- Year 3 of ULFA-B143 Undergraduate Neuroscience (with Industrial Placement) (MBio)
- Year 4 of ULFA-B141 Undergraduate Neuroscience (with Placement Year) (BSc)

This module is Option list B for:

- Year 3 of UMDA-CF10 Undergraduate Integrated Natural Sciences (MSci)