

# BS317-12 Advanced Immunology

21/22

**Department**

Life Sciences

**Level**

Undergraduate Level 3

**Module leader**

Philip Young

**Credit value**

12

**Module duration**

10 weeks

**Assessment**

20% coursework, 80% exam

**Study location**

University of Warwick main campus, Coventry

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## Description

### Introductory description

The module focuses on molecular mechanisms by which the immune system protects the host from infectious agents. Apart from presenting key components of the immune system, insight is provided into the strategies invading pathogens use to counteract the host defence. Frequently, these result in failure of pathogen elimination and in diseases due to loss of immunological control.

The module builds on the phenomena learnt in the immunology modules of years 1 and 2 (BS127 and BS211), providing more detail on underlying mechanisms and incorporating molecular and cell biological aspects. In addition, new topics, such as natural immunity, dendritic cells, and the mutual interaction between the immune system and key classes of microorganisms (viruses, bacteria, parasites) will be discussed.

[Module web page](#)

### Module aims

1. To develop knowledge and understanding of molecular immunology
2. To develop knowledge and understanding of key themes in innate and adaptive immunity
3. To develop knowledge and understanding of the 4 stages of immune responses
4. To develop knowledge and understanding of central and peripheral tolerance
5. To develop knowledge and understanding of data handling and statistical tests needed in

## 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.

Lecture 1: Introduction to the immune system (revision of Y1-2 modules and introducing Y3 course)

Lecture 2: PRR and PAMPs: main receptors involved in the innate immune response, their targets and intercellular signalling that they activate

Lecture 3: Natural Killer Cells: role of NKs in immune responses, their activation and inhibition and their effector functions.

Lecture 4: Antibodies: Function, structure, isotypes and control on antibody production

Lecture 5: TCRs: Structure, function and signalling through the TCR

Lecture 6: Diversity and Repertoire: Generation of receptor diversity in the adaptive immune response

Lecture 7: MHC molecules: Structure and function of MHC molecules

Lecture 8: MHC Class I: Epitope processing and display in class I molecules

Lecture 9: MHC II: Epitope processing and display in class II molecules

Lecture 10: APC: role and effector functions of professional APCs

Lecture 11: T cell Activation: Tripartite signals involved in T cell activation

Lecture 12: T cell Differentiation: Signalling involved in T cell differentiation and clonal expansion

Lecture 13: T Helper cells: Differentiation of T Helper cells and their effector functions

Lecture 14: Apoptosis: Extrinsic apoptosis and how CTLs and NKs trigger target cell death

Lecture 15: CTLs: activation, differentiation and effector functions of CTLs

Lecture 16: B cells: activation, differentiation and development of B cells.

Lecture 17: Central tolerance: Thymic and bone marrow tolerance

Lecture 18: Peripheral Tolerance: T and B reg cells and their role in controlling immune responses and contraction

Workshop 1: Null hypothesis testing and to-to-event analysis: review of t-tests/ u-tests, ANOVA (1-way), correlation and linear regression (including Passing Bablok), Logistic regression (binary), Cox regression and Kaplan Meier

Workshop 2: Revision session

## Learning outcomes

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

- LO1 Critically analyse and reflect on key themes in innate immunology
- LO2 Critically analyse and reflect on key themes in adaptive immunology
- LO3 Critically analyse and reflect on key themes in B and T cell differentiation, activation and clonal expansion
- LO4 Critically analyse and reflect on molecular signalling in T and B cell activation
- LO5 Demonstrate understanding of statistical tests and data analysis

## Research element

Time to

## Subject specific skills

1. Detailed knowledge of the innate and adaptive immune system
2. Detailed knowledge of the different cells of the immune system
3. Molecular understanding of how immune responses are instigated and contracted
4. Molecular understanding of how immune responses can be evaded

## Transferable skills

1. Critical analysis of research papers
  2. Poster design
  3. Survival analysis in SPSS
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## Study

### Study time

Type	Required
Lectures	18 sessions of 1 hour (15%)
Tutorials	2 sessions of 1 hour (2%)
Other activity	10 hours (8%)
Private study	90 hours (75%)
Total	120 hours

### Private study description

Students are expected to spend 90 hours on self directly learning (including reading papers, background material and revising for the final end of year exam)

### Other activity description

In-module assessment- 10 hours is based on the 5 tasks (1 for each of the statistical analyses, and 6 hours to produce the final poster)

## Costs

No further costs have been identified for this module.

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## Assessment

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

Students can register for this module without taking any assessment.

### Assessment group D1

	<b>Weighting</b>	<b>Study time</b>
In-Module Assessment	20%	
Students will need to analyse a clinical trial dataset and produce a poster based on their data		
Written Examination	80%	
Essay based exam consisting of 4 questions- students need to answer 2 of the questions in 1.5 hrs.		

### Feedback on assessment

Summative: In-module assessment will be marked and detailed feedback provided

[Past exam papers for BS317](#)

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## Availability

### Courses

This module is Core for:

- Year 3 of UBSA-3 Undergraduate Biological Sciences

This module is Core optional for:

- UBSA-C1B9 Undergraduate Biomedical Science
  - Year 3 of C1B9 Biomedical Science
  - Year 3 of C1B9 Biomedical Science
  - Year 3 of C1B9 Biomedical Science
- Year 3 of ULFA-C1A3 Undergraduate Biomedical Science (MBio)

This module is Option list A for:

- Year 3 of UBSA-C700 Undergraduate Biochemistry
- ULFA-C1A2 Undergraduate Biochemistry (MBio)
  - Year 3 of C1A2 Biochemistry
  - Year 3 of C700 Biochemistry

- UBSA-3 Undergraduate Biological Sciences
  - Year 3 of C100 Biological Sciences
  - Year 3 of C100 Biological Sciences
  - Year 3 of C102 Biological Sciences with Cell Biology
  - Year 3 of C103 Biological Sciences with Environmental Resources
  - Year 3 of C104 Biological Sciences with Microbiology
  - Year 3 of C105 Biological Sciences with Molecular Genetics
- Year 3 of ULFA-C1A1 Undergraduate Biological Sciences (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