

# BL3320 Statistical and Quantitative Skills for Biologists

(BL3320 online module handbook version 91)

**Credits:** 10

**Semester:** 1

**Module Organiser**

Prof Will Cresswell

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**Pre-requisite Modules:**

Before taking this module you must pass BL2300. The pre-requisite of BL2300 is waived for BSc Neuroscience students.

**Anti-requisite Modules:**

**Post-requisite Modules:**

**Additional Module**

**Information:**

[Please check MMS regularly for additional module information](#)



Few biologists are statisticians or mathematicians, but all biologists use statistics and mathematics. This series of workshops is designed to build confidence in organising and analysing data to address biological questions efficiently. The module will help you learn how to identify statistical and quantitative approaches, and how to manage and analyse data in a code driven statistical programming package. An introductory workshop will cover basic concepts and practical training that will be used in a choice of specific workshops that cover applications across the range of Biology.

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[BL3320View content for BL3320 \(2023/4\) in the Module Management System \(MMS\)](#)

[View the current Biology Online Module Catalogue for BL3320](#)

[BL3320View BL3320 \(2023/4\) in the University of St Andrews Module Catalogue](#)

## **Contents:**

- Cover
- Contents
- Timetable
- Reading List
- Assessment
- Who To Ask
- Contributing Staff
- Learning Outcomes
- Acquired Skills
- Policies

# BL3320: Timetable

The course is now self-enrolled online. The course is on Moodle. Search for BIO-STATS Biology Stats and self enrol please.

**Legend** (not all modules have every event type):

lecture	tutorial	workshop	practical	other
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## Semester 1: Week -1

DATE & TIME	VENUE	STAFF	EVENT
Thursday 07-09-2023 09:00 to 10:00	Purdie Building Lecture Theatre A	<a href="#">Prof Will Cresswell</a> -	Lecture L1: <b>Introduction to BL3320 Part 1</b> <small>2023-4_BL3320_L1</small> Compulsory
Thursday 07-09-2023 13:00 to 15:00	Physics Building Lecture Theatre A	<a href="#">Prof Will Cresswell</a> -	Lecture L2: <b>Introduction to BL3320 Part 2</b> <small>2023-4_BL3320_L2</small> Compulsory
Friday 08-09-2023 10:00 to 12:00	Biomedical Sciences Building Seminar Room 1	<a href="#">Prof Will Cresswell</a> -	Practical P1: <b>Setting up laptops and Macs for R</b> <small>2023-4_BL3320_P1</small> OPTIONAL drop in for new and unconfident users of R

## Semester 1: Week 1

DATE & TIME	VENUE	STAFF	EVENT
Monday 11-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Prof Will Cresswell</a> -	Workshop W1: <b>Introductory workshop session 1</b> <small>2023-4_BL3320_W1</small> Compulsory; you will be allocated a 3 hour slot this week
Tuesday 12-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Prof Will Cresswell</a> -	Workshop W2: <b>Introductory workshop session 2</b> <small>2023-4_BL3320_W2</small> Compulsory; you will be allocated a 3 hour slot this week
Thursday 14-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Prof Will Cresswell</a> -	Workshop W3: <b>Introductory workshop session 3</b> <small>2023-4_BL3320_W3</small> Compulsory; you will be allocated a 3 hour slot this week

## Semester 1: Week 2

DATE & TIME	VENUE	STAFF	EVENT
Monday 18-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Miguel Barbosa</a> -	Workshop W4: <b>GLMs and graph drawing Session 1</b> <small>2023-4_BL3320_W4</small> Compulsory; you will be allocated a 3 hour slot this week
Tuesday 19-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Miguel Barbosa</a> -	Workshop W5: <b>GLMs and graph drawing Session 2</b> <small>2023-4_BL3320_W5</small> Compulsory; you will be allocated a 3 hour slot this week
Thursday 21-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Miguel Barbosa</a> -	Workshop W6: <b>GLMs and graph drawing Session 3</b> <small>2023-4_BL3320_W6</small> Compulsory; you will be allocated a 3 hour slot this week

## Semester 1: Week 3

DATE & TIME	VENUE	STAFF	EVENT
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Monday 25-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Prof Graeme Ruxton</a> -	Workshop W7: <b>Chi-squared tests Session 1</b> <a href="#">2023-4_BL3320_W7</a> Optional; sign up for a 3 hour session this week
Tuesday 26-09-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Prof Graeme Ruxton</a> -	Workshop W8: <b>Chi-squared tests Session 2</b> <a href="#">2023-4_BL3320_W8</a> Optional; sign up for a 3 hour session this week

## Semester 1: Week 4

DATE & TIME	VENUE	STAFF	EVENT
Monday 02-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Jacqueline Nairn</a> -	Workshop W9: <b>Enzyme kinetic data analysis Session 1</b> <a href="#">2023-4_BL3320_W9</a> Optional; sign up for a 3 hour session this week
Tuesday 03-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Jacqueline Nairn</a> -	Workshop W10: <b>Enzyme kinetic data analysis Session 2</b> <a href="#">2023-4_BL3320_W10</a> Optional; sign up for a 3 hour session this week

## Semester 1: Week 5

DATE & TIME	VENUE	STAFF	EVENT
Monday 09-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Robert Patchett</a> -	Workshop W11: <b>GLMs and plotting Session 1</b> <a href="#">2023-4_BL3320_W11</a> Optional; sign up for a 3 hour session this week
Tuesday 10-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Robert Patchett</a> -	Workshop W12: <b>GLMs and plotting Session 2</b> <a href="#">2023-4_BL3320_W12</a> Optional; sign up for a 3 hour session this week

## Semester 1: Week 7

DATE & TIME	VENUE	STAFF	EVENT
Monday 23-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr V Anne Smith</a> -	Workshop W13: <b>Multiple Dependent Variables Session 1</b> <a href="#">2023-4_BL3320_W13</a> Optional; sign up for a 3 hour session this week
Tuesday 24-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr V Anne Smith</a> -	Workshop W14: <b>Multiple Dependent Variables Session 2</b> <a href="#">2023-4_BL3320_W14</a> Optional; sign up for a 3 hour session this week

## Semester 1: Week 8

DATE & TIME	VENUE	STAFF	EVENT
Monday 30-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Carolin Kosiol</a> -	Workshop W15: <b>Biomolecular curve fitting with ggplot Session 1</b> <a href="#">2023-4_BL3320_W15</a> Optional; sign up for a 3 hour session this week
Tuesday 31-10-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Carolin Kosiol</a> -	Workshop W16: <b>Biomolecular curve fitting with ggplot Session 2</b> <a href="#">2023-4_BL3320_W16</a> Optional; sign up for a 3 hour session this week

## Semester 1: Week 9

DATE & TIME	VENUE	STAFF	EVENT
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Monday 06-11-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Michael Morrissey</a> -	Workshop W17: <b>Logistic GLMs Session 1</b> <a href="#">2023-4_BL3320_W17</a> Compulsory; you will be allocated a 3 hour slot this week
Tuesday 07-11-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Michael Morrissey</a> -	Workshop W18: <b>Logistic GLMs Session 2</b> <a href="#">2023-4_BL3320_W18</a> Compulsory; you will be allocated a 3 hour slot this week
Thursday 09-11-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Michael Morrissey</a> -	Workshop W19: <b>Logistic GLMs Session 3</b> <a href="#">2023-4_BL3320_W19</a> Compulsory; you will be allocated a 3 hour slot this week

## Semester 1: Week 10

DATE & TIME	VENUE	STAFF	EVENT
Monday 13-11-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Michael Morrissey</a> -	Workshop W20: <b>Poisson GLMs Session 1</b> <a href="#">2023-4_BL3320_W20</a> Compulsory; you will be allocated a 3 hour slot this week
Tuesday 14-11-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Michael Morrissey</a> -	Workshop W21: <b>Poisson GLMs Session 2</b> <a href="#">2023-4_BL3320_W21</a> Compulsory; you will be allocated a 3 hour slot this week
Thursday 16-11-2023 14:00 to 17:00	Bute Building Bute Computer Lab	<a href="#">Dr Michael Morrissey</a> -	Workshop W22: <b>Poisson GLMs Session 3</b> <a href="#">2023-4_BL3320_W22</a> Compulsory; you will be allocated a 3 hour slot this week

## Semester 1: Week 11

DATE & TIME	VENUE	STAFF	EVENT
Tuesday 21-11-2023 14:00 to 16:00	Purdie Building Lecture Theatre B	<a href="#">Prof Will Cresswell</a> -	Lecture L3: <b>Revision lecture</b> <a href="#">2023-4_BL3320_L3</a> Optional

# BL3320: Reading List

[BL3320Click for BL3320 reading list](#)

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## BL3320: Assessment

2-hour Written Examination = 50%, Coursework = 50%

[BL3320View coursework assessment details for BL3320 \(2023/4\) in MMS](#)

The following related information applies to all Biology modules:

School of Biology Marking Criteria:	See <a href="#">JH booklet info (st-andrews.ac.uk)</a>
Late submission of continuous assessment work:	All late submissions of coursework that do not require electronic submission should be made via the Biology Teaching Office, Level 2, BMS Building, North Haugh.
Exam details:	See School of Biology UG Handbook <a href="#">JH booklet info (st-andrews.ac.uk)</a> : All Biology exams will be conducted online for 2022-23.
Exam timetable:	See <a href="#">Timetables - Exams - University of St Andrews (st-andrews.ac.uk)</a>
Expected attendance:	See <a href="#">JH booklet info (st-andrews.ac.uk)</a> for detailed attendance requirements.
Good Academic Practice & Avoiding Academic Misconduct:	See <a href="#">JH booklet info (st-andrews.ac.uk)</a>
University Student Handbook:	<a href="#">University Student Handbook</a>
School and University regulations in the School and University Undergraduate Handbook relating to absence reporting, penalties and rules for late submission of work, extensions for coursework, return of coursework, S-coding, good academic practice and Academic Alerts.:	<a href="#">JH booklet info (st-andrews.ac.uk)</a> <a href="#">University Student Handbook</a>

# Who to ask

(Information in this section applies to all Biology Modules)

**Before contacting staff**, students should check the content of the Biology Undergraduate Handbook, the module handbook and specific task instructions.

## Questions about

General teaching matters  
Rescheduled or cancelled events  
Lecture or practical content  
Completing assessed practical assignments  
Completing assessments  
Marking on continuous assessment  
Marking on exams  
Rearranging practical days  
Absence and/or extensions  
Difficulties with academic progress which impact more than one module:  
Overall performance, progress or future directions:  
Disability:  
For advice and support on any issue e.g. academic, financial, international, personal or health matters, or if you are unsure of who to go to for help:

## University assistance with urgent matters out of office hours:

## Contact

Biology Teaching Office ( [bioteach@st-andrews.ac.uk](mailto:bioteach@st-andrews.ac.uk) )  
Check your University email  
The lecturer who presented the material  
The lecturer who set the assignment  
Module Organiser ( [Prof Will Cresswell wrlc@st-andrews.ac.uk](mailto:Prof Will Cresswell wrlc@st-andrews.ac.uk) )  
The Demonstrator or Module Organiser ( [Prof Will Cresswell wrlc@st-andrews.ac.uk](mailto:Prof Will Cresswell wrlc@st-andrews.ac.uk) )  
Module Organiser ( [Prof Will Cresswell wrlc@st-andrews.ac.uk](mailto:Prof Will Cresswell wrlc@st-andrews.ac.uk) )  
Module Organiser ( [Prof Will Cresswell wrlc@st-andrews.ac.uk](mailto:Prof Will Cresswell wrlc@st-andrews.ac.uk) )  
Module Organiser ( [Prof Will Cresswell wrlc@st-andrews.ac.uk](mailto:Prof Will Cresswell wrlc@st-andrews.ac.uk) ) **and** the Biology Teaching Office ( [bioteach@st-andrews.ac.uk](mailto:bioteach@st-andrews.ac.uk) )  
Year Coordinator  
See School of Biology UG Handbook for list: [JH booklet info \(st-andrews.ac.uk\)](http://www.st-andrews.ac.uk/jh-booklet-info)  
Advisor of Studies  
Disability Coordinator ( [biodisabilities@st-andrews.ac.uk](mailto:biodisabilities@st-andrews.ac.uk) )  
Advice & Support Centre  
Address: 79 North Street, St Andrews  
Email: [theasc@st-andrews.ac.uk](mailto:theasc@st-andrews.ac.uk)  
Web: <https://www.standrews.ac.uk/ask-a-question/>  
Tel: 01334 462020  
Tel: 01334 476161  
Web: <https://www.st-andrews.ac.uk/students/advice/counselling/incrisis/>

## Biology Teaching Office:

We are happy to hear from you about teaching matters. The School of Biology Teaching Office is open Monday to Friday 09.00 - 13.00 and 14.00 - 17.00. School of Biology staff will respond to your emails during these hours. Our team will provide a response to you within three working days.

Biology Teaching Office (Level 2), University of St Andrews, Biomolecular Sciences Building, North Haugh, St Andrews, Fife KY16 9ST

Email: [bioteach@st-andrews.ac.uk](mailto:bioteach@st-andrews.ac.uk)

Tel: 01334 46 3602 or 3566

## BL3320: Contributing Staff

**Prof Will Cresswell**  
**(Module Organiser)**

Dr Miguel Barbosa

Prof Will Cresswell  
(Module Organiser)

Dr Carolin Kosiol

Dr Michael Morrissey

Dr Jacqueline Nairn

Dr Robert Patchett

Prof Graeme Ruxton

Dr V Anne Smith

Professor of Biology

Lecturer in Marine Biology

Professor of Biology

Reader

Research Fellow

Senior Lecturer

Research Fellow

Professor

Senior Lecturer

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[vas1@st-andrews.ac.uk](mailto:vas1@st-andrews.ac.uk)



## **BL3320: Learning Outcomes**

Students completing module BL3320 successfully should be able to:

- Develop statistical training from the second year.
- Continue statistical training so you become comfortable with General Linear Modelling and other commonly used statistical techniques to analyse data.
- Practice organising and analysing data in R.
- Learn and practice methods of data presentation and interpretation in R.
- Gain experience of some more advanced statistical techniques in preparation for your quantitative 4th year project or post-graduate research.

# BL3320: Acquired Skills

test

## Practical Skills

- Kinetic data analysis
- Sustainability related practical skills

## Transferable Skills

- ANOVA/Kruskal-Wallis test
- Biodiversity analysis
- Calculations/equations
- Chi-square test
- Concentrations
- Data analysis
- Data analysis (depending on project)
- Data presentation
- Deal with outliers
- Decimal places
- Descriptive statistics
- Dilutions
- Distinguish different types of data
- Draw a line of best fit
- Exponents
- Generalised Linear Models
- Handling big data
- Interpolation
- Likelihood
- Linear regression
- Logarithms
- Non-linear fit
- Other mathematical models
- Pearson/Spearman rank correlation
- Phylogenetic analysis
- Produce graphs/figures
- Produce tables
- Scaling
- Shapiro-Wilk test for normality
- SI units
- Significant figures
- Survival analysis
- t-test/Wilcoxon test
- Two-way ANOVA
- Use Excel
- Use other data analysis software
- Use R or R Studio
- Volumes
- Critiquing experimental design

- Designing experiments
- Sustainability Related Skills

# Policies

(Information in this section applies to all Biology Modules)

- The procedures and regulations followed by the School of Biology are outlined in the [University Handbook](#) and in the School of Biology UG handbook [JH booklet info \(st-andrews.ac.uk\)](#)
- All coursework associated with the module must be completed and submitted by its due date.
- Specific School regulations relating to absence reporting, penalties and rules for late submission of work, extensions for coursework, return of coursework, S-coding, Good Academic Practice and Academic Alert are stated in the School of Biology UG handbook [JH booklet info \(st-andrews.ac.uk\)](#) and students are required to carefully read these regulations.
- Students are also referred to the University Handbook, available at: <http://www.st-andrews.ac.uk/studenthandbook/>