

# MATH120: Mathematics for scientists

The language of quantitative thinking



## COURSE OVERVIEW

The modern world is built on science and technology. As such, the increasingly competitive job market requires new graduates to have confidence and fluency in quantitative problem solving. MATH 120 uses a problem-based learning approach to develop problem-solving and critical thinking skills by consistently working through applied examples from a range of scientific disciplines, while learning new techniques and tools. Students will be encouraged to try different approaches, critically analyse their findings and communicate them orally and/or as written reports. As a result, MATH 120 students will be ideally equipped to specialise in any discipline that includes a quantitative component.

**Aim:** The development of understanding, formulation and application of a variety of approaches to quantitative problem solving in scientific disciplines.

### Learning Objectives:

Upon completion of MATH120 students will:

- Understand the role of and how to formulate a scientific problem using quantitative approaches
- Identify and evaluate relevant quantitative approaches for physical, geo-, biological, biomedical, business and social sciences
- Evaluate, visualize and synthesize data for quantitative problem solving
- Identify and apply appropriate models to describe scientific problems
- Use a range of mathematical and computational techniques to solve problems

### Course Coordinators:

Associate Professor Sarah Wakes ([sarah.wakes@otago.ac.nz](mailto:sarah.wakes@otago.ac.nz))

Dr Florian Beyer ([florian.beyer@otago.ac.nz](mailto:florian.beyer@otago.ac.nz))

### Timetable:

MATH120 is a standard 13-week semester paper, with three 1-hour lectures and one 2-hour laboratory per week. Lectures are recorded but student attendance at lectures and laboratories is considered vital to the course.

### Lectures:

Monday 10 - 10.50 am

Tuesday 10 - 10.50 am

Wednesdays 10 - 10.50 am

### Laboratory Streams:

Wednesday 1 - 2.50 pm

Wednesday 3 - 4.50 pm

Thursday 10 – 11.50 am

Thursday 1 – 2.50 pm

## Timetable

Module	Week of Semester	Information	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
<b>Introduction</b>	1	<b>S1 starts</b> Introduction Labs	<b>27 Feb</b> Lecture 1	<b>28 Feb</b> Lecture 2	<b>1 March</b> Lecture 3	<b>2 March</b>	<b>3 March</b>	<b>4 March</b>	<b>5 March</b>
<b>Module 1</b>	2	Lab 1 Week	<b>6 March</b> Lecture 4	<b>7 March</b> Lecture 5	<b>8 March</b> Lecture 6	<b>9 March</b>	<b>10 March</b>	<b>11 March</b>	<b>12 March</b>
	3	Project Week A1 due	<b>13 March</b> Lecture 7	<b>14 March</b> Lecture 8	<b>15 March</b> Lecture 9	<b>16 March</b>	<b>17 March</b>	<b>18 March</b>	<b>19 March</b>
<b>Module 2</b>	4	Lab 2 Week Lab assessment 1 due	<b>20 March</b> Lecture 10	<b>21 March</b> Lecture 11	<b>22 March</b> Lecture 12	<b>23 March</b>	<b>24 March</b>	<b>25 March</b>	<b>26 March</b>
	5	Project Week Project Presentations due	<b>27 March</b> Lecture 13	<b>28 March</b> Lecture 14	<b>29 March</b> Lecture 15	<b>30 March</b>	<b>31 March</b>	<b>1 April</b>	<b>2 April</b>
	6	Project Week A2 due	<b>3 April</b> Lecture 16	<b>4 April</b> Lecture 17	<b>5 April</b>	<b>6 April</b>	<b>7 April</b> Good Friday	<b>8 April</b>	<b>9 April</b>
<b>Mid semester break</b>			<b>10 April</b>	<b>11 April</b>	<b>12 April</b>	<b>13 April</b>	<b>14 April</b>	<b>15 April</b>	<b>16 April</b>
<b>Module 3</b>	7	Lab 3 Week Lab assessment 2 due	<b>17 April</b> Lecture 18	<b>18 April</b> Lecture 19	<b>19 April</b> Lecture 20	<b>20 April</b>	<b>21 April</b>	<b>22 April</b>	<b>23 April</b>
	8	Project Week A3 due	<b>24 April</b> Lecture 21	<b>25 April</b> ANZAC Day	<b>26 April</b> Lecture 22	<b>27 April</b>	<b>28 April</b>	<b>29 April</b>	<b>30 April</b>
<b>Module 4</b>	9	Lab 4 Week Lab assessment 3 due	<b>1 May</b> Lecture 23	<b>2 May</b> Lecture 24	<b>3 May</b> Lecture 25	<b>4 May</b>	<b>5 May</b>	<b>6 May</b>	<b>7 May</b>
	10	Project Week A4 due	<b>8 May</b> Lecture 26	<b>9 May</b> Lecture 27	<b>10 May</b> Lecture 28	<b>11 May</b>	<b>12 May</b>	<b>13 May</b>	<b>14 May</b>
<b>Module 5</b>	11	Lab 5 Week Lab assessment 4 due	<b>15 May</b> Lecture 29	<b>16 May</b> Lecture 30	<b>17 May</b> Lecture 31	<b>18 May</b>	<b>19 May</b>	<b>20 May</b>	<b>21 May</b>
	12	Project Week A5 due	<b>22 May</b> Lecture 32	<b>23 May</b> Lecture 33	<b>24 May</b> Lecture 34	<b>25 May</b>	<b>26 May</b>	<b>27 May</b>	<b>28 May</b>
	13	Project Week Lab assessment 5 due Project report due	<b>29 May</b> Lecture 35	<b>30 May</b> Lecture 36	<b>31 May</b>	<b>1 June</b>	<b>2 June</b>	<b>3 June</b>	<b>4 June</b>

**Assessment and proposed due dates:**

Final grade compilation is 100% from internal assessment.

<b>Assignment</b>	<b>%</b>	<b>Due date</b> <i>(at 11.59pm unless otherwise stated)</i>
A1	8	19 <sup>th</sup> March
A2	8	9 <sup>th</sup> April
A3	8	30 <sup>th</sup> April
A4	8	14 <sup>th</sup> May
A5	8	28 <sup>th</sup> May
L1	6	Week starting 20 <sup>th</sup> March <i>(day before lab)</i>
L2	6	Week starting 17 <sup>th</sup> April <i>(day before lab)</i>
L3	6	Week starting 1 <sup>st</sup> May <i>(day before lab)</i>
L4	6	Week starting 15 <sup>th</sup> May <i>(day before lab)</i>
L5	6	Week starting 29 <sup>th</sup> May <i>(day before lab)</i>
Project oral presentation	10 (group)	Week starting 27 <sup>th</sup> March <i>(in lab)</i>
Project report	20	2 <sup>nd</sup> June

The laboratory activities are due two weeks after your laboratory. It is important that you use the correct submission link for your lab stream.

**Terms Requirements**

Completion of 3 out of 5 laboratory assignments

Submit the final report

The University of Otago uses the following standard scale for converting numerical marks awarded into grades:

Pass									Fail	
A+	A	A-	B+	B	B-	C+	C	C-	D	E
100 -	89 -	84 -	79 -	74 -	69 -	64 -	59 -	54 -	49 -	<
90	85	80	75	70	65	60	55	50	40	40

**Late submission of assignments:**

- There are no late submissions of the STACK online assignments. You can be excused from at most 2 online assignments.
- Late submissions of labs will incur a 5% penalty per day up until the marks have been returned unless an extension has been granted. After this date late assignments will not be marked unless an extension has been approved.
- No late submission is accepted for the final assignment (project report) without an approved extension.

### ***Extensions***

Extensions need to be managed by the student through direct communication with the course coordinator. Early communication with the course coordinator about any issues affecting attendance or performance is encouraged. Student health declarations (part A) [<http://www.otago.ac.nz/studenthealth/forms/>] or other relevant documentation as appropriate are required for all requests for extensions and must be sent directly to the course coordinator. Part B of the student health declaration is required only for significant absences.

### ***Online assignments***

There will be 5 online assignments, i.e. one for each module. The assignments will be run on the online assessment platform STACK, which is integrated into Blackboard.

- **You will be given three (3) chances to answer each question**, with a 10% penalty at the 2<sup>nd</sup> and 3<sup>rd</sup> attempt.
- Your mark for each question will be the best attempt of the 3.
- You will get feedback about whether you got a question right or wrong via the “Check” button. If your answers are right you can move onto the next question but if wrong you will be prompted to “Try Again”, either immediately or later.
- If you are struggling with a question please ask for guidance at a laboratory session.
- **You can only submit the assignment once** so make sure you do not do a final submission of the assignment until you are ready.

### ***Lab-based assessments***

During the lab weeks, you will be given an activity to complete by the end of the session. The lab activities will help you develop your computing skills as you will work with computing software Excel and MATLAB. These activities are assessed and due in two (2) weeks after your lab session. We will not accept submissions using the incorrect submission link so make sure you know which your lab stream is.

### ***The project***

The third component of the assessment for MATH120 is a semester-long project that you will work on in groups of 2 or 3. The groups will be formed during the lab session in week 1 of the semester. In the project weeks you will be given an activity to complete as part of the project. Each activity covers techniques and concepts from one module. As opposed to the lab-based assessment, you do not have to complete each activity by the end of the session. In fact, it is likely that you will need to work on the activity outside the scheduled lab sessions. During the lab session in week 13 you will synthesize your findings from each activity and start planning your report and presentation. The assessment takes 2 forms:

- A group presentation (5 minutes) where all members of the group have to take part to get the mark (Week 5) based on Project Activity 1.
- A final individual report (Week 13) based on Project Activities 2-5.

## Academy Integrity

Academic integrity means being honest in your studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage. Students are expected to be aware of, and act in accordance with, the University's Academic Integrity Policy.

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, submitting work written by someone else (including from a file sharing website, text generation software, or purchased work) taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University's Student Academic Misconduct Procedures.

It is your responsibility to be aware of and use acceptable academic practices when completing your assessments. To access the information in the Academic Integrity Policy and learn more, please visit the University's Academic Integrity website at [www.otago.ac.nz/study/academicintegrity](http://www.otago.ac.nz/study/academicintegrity), or ask at the Student Learning Centre (HEDC) or the Library, or seek advice from your paper co-ordinator.

For further information:

Academic Integrity Policy

<http://www.otago.ac.nz/administration/policies/otago116838.html>

Student Academic Misconduct Procedures

<http://www.otago.ac.nz/administration/policies/otago116850.html>

**Disability:** The Department encourages students to seek support if they find they are having difficulty with their studies due to a disability, temporary or permanent impairment, injury, chronic illness or deafness. Contact Disability Information and Support, (Ph 479-8235, email [disabilities@otago.ac.nz](mailto:disabilities@otago.ac.nz), website <http://www.otago.ac.nz/disabilities>).

**Class Representative:** A class representative will be nominated for the course. You are welcome to bring any issues you have to the attention of your class representative for discussion at these meetings.

**Problems:** Should you experience any problems with any aspect of this paper, you should first see the person teaching the relevant section of work. If the problem is not resolved or discussion with the teacher is not appropriate, please contact the course co-ordinator [Associate Professor Sarah Wakes].