Discrete Mathematics and Probability

Lecture 1

Welcome to the Course

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School of Informatics
The University of Edinburgh

Monday 21 September 2026

Welcome to DMP

Discrete Mathematics and Probability

This is a second-year undergraduate course for students in the School of Informatics.

The course covers topics fundamental across informatics: sets, numbers, functions, relations, methods of proof, counting methods, probability, random variables, distributions, and statistics.

Many of you will recognize some of this material and be confident in using it; for everyone some part will be new. The aim is that end of the course all of you will be capable in working across all the topics covered.

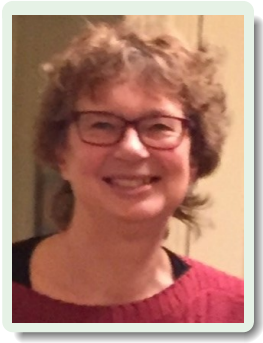
Lectures	Mondays and Thursdays 1410–1500
Study Guides	Reading and short videos released online weekly
Tutorials	Tuesdays and Wednesdays, starting in Week 2
Coursework	Weekly online quizzes and written homework
Exam	Final 2-hour written exam in December

DMP Course Lecturers

Rob van Glabbeek

Markulf Kohlweiss

Ian Stark



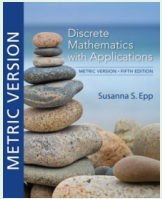
Heather Yorston

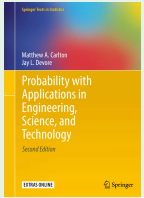
Resources

Lectures

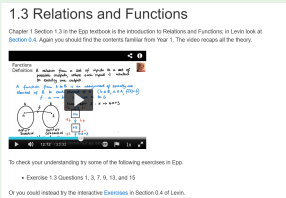
Tutorials

Textbooks





Study Guides



Lectures

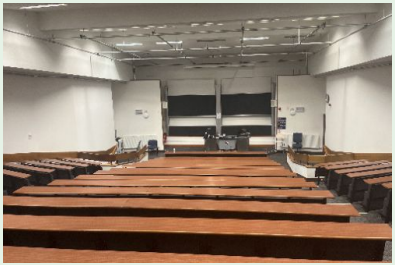
1410–1500 Monday and Thursday every week

Mondays Lecture Theatre B of the 40 George Square Lecture Theatres

Thursdays Lecture Theatre C of the 40 George Square Lecture Theatres

Lectures will be streamed live and then available for reviewing. Access is through Learn.

40 George Square Lecture Theatres



Lecture Theatre C

Tutorials

Tutorials start in Week 2 and run on Tuesdays and Wednesdays.

There are six tutorial groups, with students allocated automatically. Each group has two assigned tutors.

In tutorials all students work in small groups on a problem sheet for the week. There is also opportunity to review homework exercises and discuss with tutors.

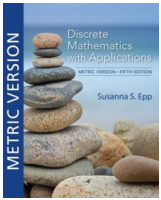
If you are unable to attend your assigned tutorial group one week then please go to one of the other groups, telling the tutor there when you arrive.

If you wish to switch to a different tutorial group then please use the Self Change functionality within the MyGroups section of the Timetabler web site at https://timetabler.is.ed.ac.uk

Textbooks

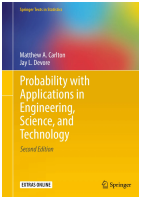
The University Library has paid for students to have access to both course textbooks. Visit Learn and follow *Library Resources* → *Resource List* → *Core Reading* to read them online.

Susanna S. Epp
Discrete Mathematics with Applications
Fifth Edition, Metric Version. Cengage, Australia.



Note: The "Download" option is closed as this blocks access by other students for 24 hours. Instead always choose "Read Online".

Matthew A. Carlton and Jay L Devore
Probability with Applications
Second Edition. Springer International.



The library provides PDF and EPUB versions to download.

Some Generally Helpful Practices

Be precise and correct.

Second order precision: know when you are being precise, and to what degree; know when it matters to be precise; know when it does not.

"We demand rigidly defined areas of doubt and uncertainty" — *Vroomfondel*
The Hitchhikers Guide to the Galaxy, Douglas Adams
https://is.gd/deepthought

Be prepared to code switch: is set complement A^c or $\overline{A}$ or ...?

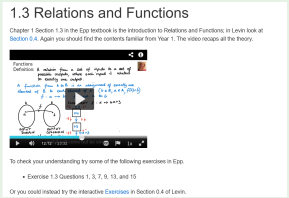
Postel's Law — RFC 761

2.10. Robustness Principle

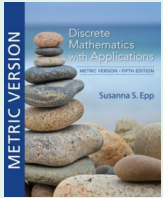
TCP implementations should follow a general principle of robustness: be conservative in what you do, be liberal in what you accept from others.

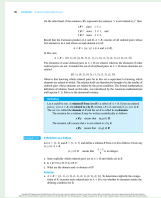
Weekly Study Guides

Study Guides

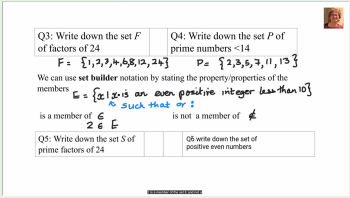


Reading

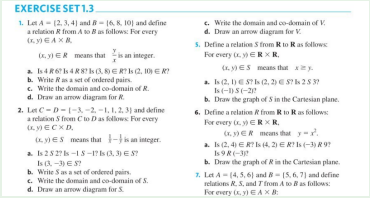




Videos



Exercises



More Ways to Learn

Quizzes

Question 1
Not yet answered
Marked out of 1.00
Flag question

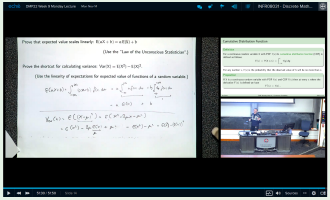
Let X be the number of flights that, on any given day, arrive late at Edinburgh Airport. It is estimated that X has the probability distribution function p shown here.

x	0	1	2	3
$p(x)$	$\frac{1}{3}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{6}$

Find the expected value of X and X^2, and hence find the variance of X. Give your answers as fractions.

$E(X) =$ ____
$E(X^2) =$ ____
$V(X) =$ ____

Recordings



Homework Exercises

Question 1

A biscuit factory has three machines used to pack biscuits into large boxes that are then sent out to supermarkets. The machines are labelled A, B, and C, and every day each machine packs many boxes of biscuits. The machines work at different speeds: from all the boxes produced on a given day 40% were packed by A, another 40% by B, and the remaining 20% by machine C.

Some biscuits break during the packing process, which is a problem. Machine A does this quite a lot: for any box packed by A there is a probability 0.1 that it contains some broken biscuits. Machine B is better, with a probability 0.03 that a box from that machine will contain some broken biscuits. Machine C is best of all, with a probability of just 0.01 that a box it packs will have some broken biscuits. All of these probabilities are independent for every box.

Before the boxes are sent out from the factory a few are picked out at random and checked to see whether they contain any broken biscuits.

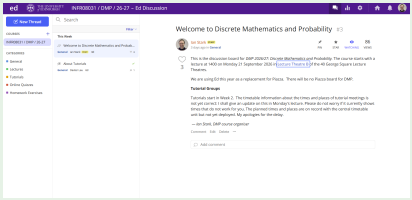
1.1 What is the probability that a box contains some broken biscuits?

1.2 One of the boxes being checked does contain broken biscuits. What is the probability that it was packed by machine B?

For each part include your working as well as the final answer. State any important results that you use in your calculation.

[7 marks]

Ed Discussion



Online Quizzes

Weekly online quizzes are released on Thursdays for completion by noon on the following Thursday. Quizzes run on STACK/CodeRunner, reached through Learn.

Quizzes on STACK are randomized: every student sees the same questions, but with different values and answers.

For each quiz you have two attempts, each up to 60 minutes. Students with additional time in exams get more time in each quiz. There are no extensions or adjustments for late submission.

If you are unable to complete a quiz one week then do as much as you can and move on.
This will not be part of your final course grade.

The online STACK tool provides automatic marking and custom feedback for each student: if you get a question wrong then the tool explains why, and after your final attempt it sets out a correct answer.

Homework Exercises

Weekly homework exercises are released on Thursdays for completion by noon on the following Thursday. Submission is by upload to GradeScope, reached through Learn. There are no extensions or extra time adjustments for weekly exercises.

If you are unable to complete one week's homework then submit what you have and move on. This will not be part of your final course grade.

Submissions are marked by tutors and returned with comments in time for your next tutorial where you can discuss your work with each other and the tutors.

There are six homework exercise sets:

Discrete Mathematics	Weeks 2, 3, and 4
Probability	Weeks 8, 9, and 10

Weekly Timetable

Thursday 1410–1500 Lecture and release of study guide, videos, homework, online quizzes

Monday 1410–1500 Lecture

Tuesday, Wednesday Tutorials

Thursday 1200 Deadline for completion of online quizzes and upload of homework solutions

Thursday 1410–1500 Lecture

This course accounts for $1/3$ of your academic credit this semester and you should plan to spend on it a correspondingly substantial fraction of your study time. I recommend a baseline of *at least 10 hours each week* across in-person activities, studying, and coursework.

Assessment

Final Exam

- Two-hour written paper in an exam hall.
- (Some students receive additional time or sit in a different room.)
- Part A: Questions on Discrete Mathematics. Total 50 marks.
- Part B: Questions on Probability. Total 50 marks.
- You can take in one A4 page (two sides) of notes.

Only the final written exam contributes to the course grade. The pass threshold is 40/100 and letter grades A–H follow the university Common Marking Scheme.

A resit examination in August 2027 offers a complete retest of all material in the course.

Summative Assessment and Formative Assessment

Summative Assessment

- Assessment *of* Learning.
- Certifies how well you know some things and can perform some tasks.
- Determines final marks and grades. (“For credit”)
- Tax.

Formative Assessment

- Assessment *for* Learning.
- Feedback: identifies what you do and don’t know or can do; helps improvement.
- No risk to final marks or grades.
- Investment.

Collaboration, Cooperation, Consultation

Anything handed in for summative assessment must be your own unaided work. In DMP, this is only the final written exam: this you will sit yourself with a pen, pencil, scientific calculator, and the A4 page of notes you take in.

Please remember the good scholarly practice requirements of the University regarding work for credit. You can find guidance at the School page

https://informatics.ed.ac.uk/taught-students/all-students/your-studies/academic-misconduct

This also has links to the relevant University pages.

For all in-course work — tutorial exercises, weekly homework, online quizzes, study guides, textbook readings — you are free to consult with others, ask questions on Ed and in lectures, and discuss your ideas about solutions. Please do!

Collaboration, Cooperation, Consultation, and Generative AI

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Note in particular the section on *Cognitive Offloading*. This can be a particular concern when you are trying to learn new skills or techniques: where the aim of an activity is not to obtain a final result but instead to gain experience in carrying out a challenging task.

Course Syllabus

Discrete Mathematics

Weeks 1–5: Rob van Glabbeek

Logic and set theory; proof by cases, counterexamples, contraposition, and contradiction; integers, rationals, and divisibility; sequences and sums; mathematical induction; functions and relations; cardinality; modular arithmetic and cryptography.

Probability

Weeks 7–11: Markulf Kohlweiss, Ian Stark

Counting and sampling; conditional probability; Bayes' Theorem; random variables; probability distributions; density functions; discrete vs. continuous probability; normal distribution; covariance and correlation; Central Limit Theorem.

What To Do Next

- Log in to DMP on Learn through MyEd or directly at https://www.learn.ed.ac.uk.
- Follow the Week 0 to-do list there.
- Visit the course web pages at https://opencourse.inf.ed.ac.uk/dmp.
- Follow the Week 1 Study Guide there.
- Complete the Week 1 Online Quiz (access through Learn as STACK: Online Quizzes).
- Attend Thursday's lecture at 1400 next door in 40 George Square Lecture Theatre C.

Any Questions? Raise your hand or come up to the front at the end of the lecture.