MA40189 Topics in Bayesian statistics

2024/25 Semester II

Contacts

- **Lecturer:** Simon Shaw 4W4.10, s.shaw@bath.ac.uk

- **Unit homepage:** https://moodle.bath.ac.uk/course/view.php?id=1179

- **Lecture notes:** http://people.bath.ac.uk/masss/ma40189/MA40189-notes.pdf

Anticipated timetable

Week	Tuesday 15:15 CB4.5	Thursday 11:15 6E2.1	Friday 16:15 3E2.4
19 (03 Feb 25)	Lecture 1	Lecture 2	Problems Class
20 (10 Feb 25)	Lecture 3	Lecture 4	Problems Class Question Sheet One out
21 (17 Feb 25)	Lecture 5	Lecture 6	Problems Class Question Sheet One in Question Sheet Two out
22 (24 Feb 25)	Lecture 7	Lecture 8	Problems Class Question Sheet Two in Question Sheet Three out
23 (03 Mar 25)	Lecture 9	Lecture 10	Problems Class Question Sheet Three in Question Sheet Four out
24 (10 Mar 25)	Lecture 11	Lecture 12	Problems Class Question Sheet Four in Question Sheet Five out
25 (17 Mar 25)	Lecture 13	Lecture 14	Problems Class Question Sheet Five in Question Sheet Six out
26 (24 Mar 25)	Lecture 15	Lecture 16	Problems Class Question Sheet Six in Question Sheet Seven out
27 (31 Mar 25)	Lecture 17	Lecture 18	Problems Class Question Sheet Seven in Question Sheet Eight out
30 (21 Apr 25)	Lecture 19	Lecture 20	Problems Class Question Sheet Eight in Question Sheet Nine out
31 (28 Apr 25)	Lecture 21	Lecture 22	Revision class?

Feedback and assessment

- **Homework:** There will be weekly question sheets handed out in the Friday problems class. They should be submitted in the problems class on the following Friday. The question sheets contain questions for submission and also extra questions which may be discussed in the problems class. The extra questions provide additional insight into both the course material and the questions for submission.

- **Feedback:** Any work submitted by the hand-in deadline will be marked and returned, with personal feedback, to you. Full solutions to the extra questions will be published on moodle following the problems class in which they were discussed. Full solutions to all questions will be published on moodle immediately following the hand-in deadline with hard copies available in the corresponding problems class. General feedback sheets will be made available.

- **Office hours:** I am happy to discuss any matters relating to the course at any time, either via email or one-to-one. If you would like to meet then just send me an email, with a list of proposed times and whether you wish to meet in-person or on Teams.

- **Assessment:** 100% exam.

Syllabus

Credits: 6

Level: Masters

Period: Semester 2

Assessment: Examination 100%

Other work: There will be weekly question sheets. These will be set and handed in during problems classes.

Requisites: Before taking this unit you must take MA40092.

Description: **Aims & Learning Objectives:**
Aims:
To introduce students to the ideas and techniques that underpin the theory and practice of the Bayesian approach to statistics.
Objectives:
Students should be able to formulate the Bayesian treatment and analysis of many familiar statistical problems.
Content:
Bayesian methods provide an alternative approach to data analysis, which has the ability to incorporate prior knowledge about a parameter of interest into the statistical model. The prior knowledge takes the form of a prior (to sampling) distribution on the parameter space, which is updated to a posterior distribution via Bayes' Theorem, using the data. Summaries about the parameter are described using the posterior distribution. The Bayesian Paradigm; decision theory; utility theory; exchangeability; Representation Theorem; prior, posterior and predictive distributions; conjugate priors. Tools to undertake a Bayesian statistical analysis will also be introduced. Simulation based methods such as Markov Chain Monte Carlo and importance sampling for use when analytical methods fail.