# WM9QE-15 Applied Statistics for Artificial Intelligence

## 25/26

**Department**
WMG
**Level**
Taught Postgraduate Level
**Module leader**
Awinder Kaur
**Credit value**
15
**Module duration**
4 weeks
**Assessment**
100% coursework
**Study location**
University of Warwick main campus, Coventry

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# Description

## Introductory description

In the context of continuous improvement within AI systems and processes, the utilization of advanced statistical tools, tailored for the dynamic AI landscape, proves instrumental in facilitating progress from foundational enhancements to achieving excellence. This module covers statistical methods essential for effective data modelling in AI. It describes the application of statistical techniques for comprehensive data analysis and interpretation. Additionally, it explores some of the tools for investigating processes, aiming either to solve specific problems or to gain insights that can shape future development and enhancement strategies.

## Module aims

This module aims to equip students with advanced statistical knowledge and skills to analyse, model, and solve problems in diverse real-life systems, in particular Artificial Intelligence scenarios. By developing proficiency in creating and applying statistical models effectively in problem-solving and decision-making contexts, students gain a profound understanding of the applicability of different statistical techniques to common problems and best practices for AI. The module strives to expand basic tools, enabling students to navigate complexities within data analytics.

# 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.

Statistical models and "real world" systems.

Statistical Distributions (Continuous and Discrete).

Exploratory Data Analysis.

Sampling and Inference.

Analysis of Variance (ANOVA).

Regression (linear and non-linear) and Correlation

Time-series Analysis.

# Learning outcomes

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

- Evaluate the assumptions and assess the appropriateness of different statistical models for diverse scenarios, incorporating AI techniques to enhance model selection and performance evaluation.
- Apply advanced statistical tools and techniques to solve problems in real-world systems.
- Critically interpret the quantitative data analysis results, present them in a meaningful way for decision making and provide practical recommendations.
- Demonstrate advanced practical skills in implementing statistical analyses using applicable software packages and AI-driven tools to automate data processing and analysis, and illustrate the outcomes through clear visualizations.
- Collaboratively apply statistical tools and methods tailored to specific scenarios, present robust statistical solutions, identify and address challenges and provide insightful recommendations for decision making.

# Indicative reading list

N. R. Draper, Applied Regression Analysis, Wiley (1998), ISBN: 9780471170822, 9781118625620.

C. Chatfield, Problem Solving, A Statistician's Guide, CRC (2017), ISBN: 1482224208, 0429158750, 9781482224207, 9780429158759.

A. P. Field, An Adventure in Statistics: The Reality Enigma, SAGE (2016), ISBN: 1446210448, 1446210456, 9781446210444, 9781446210451

J. Unpingco, Python for Probability, Statistics, and Machine Learning, Springer (2022), ISBN: 303104648X, 9783031046483.

## International

Topics are of high international demand

## Subject specific skills

Students are expected to gain/improve on the following:

Data management and statistical analysis.

Clear mathematical communication.

Advanced quantitative reasoning.

Statistical modelling.

Use of software to support decision making.

## Transferable skills

Analytical skills, Problem-solving, Communication, Organization, Teamwork, Flexibility

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# Study

## Study time

| Type | Required |
| --- | --- |
| Lectures | 10 sessions of 1 hour (7%) |
| Seminars | 20 sessions of 1 hour (13%) |
| Online learning (independent) | 60 sessions of 1 hour (40%) |
| Assessment | 60 hours (40%) |
| Total | 150 hours |

## Private study description

No private study requirements defined for this module.

## Costs

No further costs have been identified for this module.

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# Assessment

You must pass all assessment components to pass the module.

## Assessment group A

|  | Weighting | Study time | Eligible for self-certification |
|---|---|---|---|
| Group Assessment | 30% | 18 hours | No |

Group presentation of visualisation and analysis of case study data

Peer Marking Process will be adopted in this assessment.

|  | Weighting | Study time | Eligible for self-certification |
|---|---|---|---|
| Assignment | 70% | 42 hours | Yes (extension) |

Discussion and analysis based on a given project. The statistical report in essay format includes figures, tables, and screenshots to present the obtained results.

## Feedback on assessment

Verbal feedback for group assessment. Written feedback for assignment.

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# Availability

There is currently no information about the courses for which this module is core or optional.