

ES3H3-15 Intelligent System Design

20/21

Department

School of Engineering

Level

Undergraduate Level 3

Module leader

Thomas Popham

Credit value

15

Module duration

15 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

ES3H3-15 Intelligent System Design

[Module web page](#)

Module aims

By the end of the module the student should be able to:

1. Describe the typical software and hardware architectures of intelligent systems in various domains
2. Apply machine learning techniques to solve real-world problems
3. Apply computer vision techniques for solving problems such as face recognition and motion estimation.

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.

Computer Vision Topics:

- Edges, corners, gradients
- Feature detectors
- Motion estimation / Tracking
- Camera model / Stereo
- Object detection
- Machine Learning Topics:
 - Linear/Ridge/Lasso Regression
 - Model fitting techniques: gradient descent, Newton's method.
 - Classification: Logistic Regression, Naive Bayes, GDA
 - Neural Networks: Back-propagation, shallow and deep architectures

Learning outcomes

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

- 1. Describe the typical software and hardware architectures of intelligent systems in various domains
- 2. Select, apply and evaluate machine learning techniques for solving real-world problems
- 3. Select, apply and evaluate computer vision techniques for solving problems such as face recognition and motion estimation

Indicative reading list

Lei, B., Xu, G., Feng, M., van der Heijden, F., Zou, Y., de Ridder, D. and Tax, D.M., 2017. "Classification, parameter estimation and state estimation: an engineering approach using MATLAB". John Wiley & Sons.

- Murphy, Kevin P. "Machine learning: a probabilistic perspective". MIT press, 2012. - Gomaa, Hassan. "Real-Time Software Design for Embedded Systems". Cambridge University Press, 2016.

Subject specific skills

Systems Engineering approach, Software Engineering, Programming.

Transferable skills

Project Management, Team work, Presentations.

Study

Study time

Type	Required	Optional
Project supervision	2 sessions of 2 hours (3%)	
Practical classes	13 sessions of 2 hours (17%)	
Online learning (independent)	(0%)	2 sessions of 2 hours
Private study	120 hours (80%)	
Total	150 hours	

Private study description

120 hours guided independent study

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A2

	Weighting	Study time	Eligible for self-certification
Assessment component			
Lab Assessments	70%		No
Programming assignments / in-class tests			
Reassessment component is the same			
Assessment component			
Group Project	30%		No
Reassessment component			
individual project			No
Individual version of group project			

Feedback on assessment

- Support through advice and feedback hours.
 - Written feedback on individual projects
 - Written feedback on group projects
 - Cohort feedback in lectures on coursework performance
- Each of the component must be passed ($\geq 30\%$) in order to pass the module
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Availability

Courses

This module is Core for:

- Year 3 of UESA-HH35 BEng Systems Engineering
- Year 4 of UESA-HH34 BEng Systems Engineering with Intercalated Year
- UESA-HH31 MEng Systems Engineering
 - Year 3 of HH31 Systems Engineering
 - Year 3 of HH35 Systems Engineering

This module is Core optional for:

- Year 3 of UESA-H115 MEng Engineering with Intercalated Year
- Year 4 of UESA-HH32 MEng Systems Engineering with Intercalated Year

This module is Optional for:

- Year 3 of UESA-H113 BEng Engineering
- Year 3 of UESA-H114 MEng Engineering
- Year 4 of UESA-H115 MEng Engineering with Intercalated Year

This module is Option list A for:

- Year 4 of UESA-H111 BEng Engineering with Intercalated Year
- Year 3 of UESA-H112 BSc Engineering