School of Informatics Course Proposal Form (version: May 2021)

Please see Page 2 for instructions on which parts of this form to complete, whom to consult with to avoid unnecessary effort, and where to send the completed form.

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Cover page: Basic permanent course information

Unless otherwise noted, items in this section are entered into EUCLID and **cannot** be changed without creating an entirely new course.

Course Name	Computational Neuroscience
Is this an EPCC course?	_X_ No (default) *(If you don't know what EPCC is, this is the right choice.)* __ Yes *(If so, leave Course Acronym blank, to be filled in by ITO as EPCC/<number> for Theon and our Sortable List.)*
Course Acronym *(used only School-internally)*	CNS
SCQF Credit Level and Normal Year Taken	**Standard options for Informatics courses:** __ Level 8/Year 1 __ Level 8/Year 2 __ Level 10/Year 3 (also available in Year 4). *[In practice, most level 10 courses have many students in both UG3 and UG4. MSc students may take up to 20 credits at Level 10.]* _X_ Level 11/Year 4 (also available in Year 5 and MSc). *[These courses are listed as options in both UG and MSc DPTs.]* __ Level 11/PG (also available in Year 5). *[These courses are normally for MSc and UG5 students. They are not explicitly listed in UG4 DPTs, but UG4 students can take limited credits of them.]* __ Level 11/PG (only). *[These courses are not available to UG4 or UG5 students. Examples: CDT courses; CPD courses.]* **Other options. Please provide justification if using:** __ Level 9/Year 3 *[Deprecated except for compulsory UG3 courses. The course will not be available to other years.]* __ Level 10/Year 4 __ Other:
SCQF Credit Points	_X_ 10 __20 __40 __60 __80 __Other:
Delivery Location	_X_ Campus __On-line Distance Learning
Course Type	_X_ Standard (default) __Dissertation __Online Distance Learning __Placement __Student Led Individually Created Course __Year Abroad
Marking Scheme	_X_ Standard (numerical) __Letter grade only __Pass/Fail *[Normally only for externally delivered courses]*

Guidance for remaining sections:

Before starting your proposal: please contact the DDoLT (Curriculum) informally before starting to complete this form, with at least the following information:

- Tentative course title, level, year, and number of credits
- Who the target audience is, and why the course is needed.

The DDoLT (Curriculum) or delegate will schedule a meeting with you to discuss your plans and whether a full course proposal makes sense. If so, you will be provided with further instructions.

Deadlines: New courses must be approved by the December BoS meeting to ensure allocation of teaching staff for the following academic year. Since it may require considerable discussion and iteration to prepare the proposal, you should **contact the DDoLT (Curriculum) as early as possible, ideally in spring or summer**, and you should **plan on submitting your full proposal by November.**

Submitting your proposal: When your proposal is complete, please submit to **iss-bos@inf.ed.ac.uk**.

Colour coding and item-by-item guidance:
Guidance is provided in italics for each item. Please also refer to the guidance for new course proposals at http://www.inf.ed.ac.uk/student-services/committees/board-of-studies/course-proposal-guidelines. Examples of previous course proposal submissions are available on the past meetings page http://web.inf.ed.ac.uk/infweb/admin/committees/bos/meetings-directory but note that the proposal form was updated in Apr 2021.

Sections in gold are for student view and are required before a course can be entered into DRPS.
Sections in orange are for School use but are still required for all courses (even those that have already been approved based on other documentation).
Section in gray are for consideration by the Board of Studies. They are normally required for all new course proposals but may be omitted in some cases, with permission (e.g., for invited proposals).

Glossary of terms:

(D)DoLT: (Deputy) Director of Learning and Teaching.

DRPS (The Degree Regulations and Programmes of Study): Provides the University's official listing and descriptions of courses, degree programmes, and the regulations that govern them; updated annually in April. Course information in DRPS is considered a contract with students.

DPT (Degree Programme Table): Lays out the course requirements for each year of a degree. All UoE degrees have a DPT in the DRPS.

Path: A system that students use to help choose courses and view options in their DPT. The information feeds through from DRPS but has a more student-friendly interface (e.g., by highlighting courses that are not running or where the student hasn't satisfied prerequisites).

SCQF (The Scottish Credit Qualifications Framework): Lays out the requirements for courses at different levels and with different numbers of credits.

1. Course overview and case for support

Except as noted, all fields are required and will go into the DRPS (course catalogue) entry for students. Important: Text in DRPS is effectively a contract with students, so should not include details that are likely to change from year to year.

Summary Description (for DRPS)
Provide a brief official description of the course, around 100 words. This should be student-friendly, as it is the part of the descriptor a student is most likely to read. If this course replaces another course, please say so in this summary. In this course we study computation in neural systems. We will consider problems such as: How do neurons work and how do they communicate with one another? How do groups of neurons work together to form representations of the external world? How are memories stored and retrieved in the brain? We will employ a combination of bottom-up and top-down approaches, meaning that we study these problems both by modelling and simulating the biological hardware, and by taking inspiration from artificial intelligence to try to build theories of the brain.

Contribution to curriculum; target audience and expected demand; consultation (for BoS only)

Why is this course needed and how does it relate to existing courses and degree programmes (including any prerequisite courses)?	The School of Informatics has traditionally maintained a broad offering of taught courses in computational neuroscience, including Neural Computation (NC), Neural Information Processing (NIP), Computational Neuroscience of Vision (CNV), and Computational Cognitive Neuroscience (CCN). In AY 2020/21 and 2021/22 this was reduced to just one course (CCN). All of these courses have been popular choices for students in your Cognitive Science degrees (UG4 and MSc), and students in AI degrees interested in neural-inspired approaches in AI. In addition to narrowing the range of optional courses available to students in an area which has historically been popular, this reduction in computational neuroscience courses brings challenges for the delivery of other courses and projects within the School. CCN students had traditionally studied NC in semester 1, which was an informal prerequisite. Since the removal of NC in S1, CCN students have struggled with a steepened learning curve as they grapple with the basic neuroscience concepts required for the course. In addition, CCN is increasingly moving towards specialised content in computational psychiatry, which further broadens the gap in traditional computational neuroscience course offerings within the School. There are also a substantial number of computational neuroscience UG and MSc projects each year. The majority of students

	taking these projects find the learning curve challenging, and spend a long time on background reading before beginning their project. These issues are best addressed by reviving a specialised course in computational neuroscience in Semester 1. The proposed course (Computational Neuroscience, CNS) would combine elements of NC, which had centred around biophysics and computation within neural systems, and NIP, which had focused on machine learning approaches to understanding the brain and neurally-inspired approaches to artificial intelligence. CNS would run in S1 as a recommended prerequisite for CCN in S2. As has historically been the case for NC and NIP, CNS would run as a standalone course that complements existing courses in cognitive science and machine learning (e.g., CCS, MLPR, IAML), offering a more biologically-grounded perspective on topics related to computation and cognition. Students interested in biology more generally could also complement CNS with courses in bioinformatics currently offered within the School. This course combines elements from two previous courses: Neural Computation (NC) and Neural Information Processing (NIP). CNS contains less biological detail than NC but incorporates information theoretic approaches to understanding the nervous system and neurally-inspired computational architectures previously taught in NIP.
What is the target audience, in terms of background and interests, and what is the expected demand (class size) for the course? *State what your estimate is based on: e.g. by referring to projects in an area, sizes of similar courses, employer demand, etc. A survey of students may be requested once the main descriptor information is ready.*	This course will primarily target students from the CogSci and Artificial Intelligence UG and MSc programmes. Students interested in more biologically-grounded approaches to both cognition and artificial intelligence will benefit from this course. We have historically found that NC, NIP, and CCN attract a number of students from outside SoI (e.g., from physics, mathematics, psychology, philosophy, etc.). Based on the number of students enrolled in CCN, we anticipate a class size of 50-100 students.
Has this proposal been discussed with the DDoLT (Curriculum) or DoLT prior to BoS submission?	_X_ Yes ___ No
Who else has been consulted? *Proposals should typically be discussed with relevant colleagues, including the programme director (for MSc courses). Summarize their comments if needed.*	The proposal has been discussed with Sharon Goldwater, Bjoern Franke, and the CogSci working group. It was agreed that the proposal fits well with current plans provided that

	the mathematical prerequisites are kept in line with UG4 CogSci students.

Course Description (for DRPS)

This student-facing description should normally include (a) a more in-depth description of the learning aims, nature and context of the course, (b) a rough outline of the content, and (c) a description of how the course will be taught, and how students are expected to engage with it and to demonstrate their achievement of the learning outcomes.
Note: Please keep this section general enough to avoid the need for yearly updates, and keep in mind that you should have only around 15 lecture hours of examinable material per 10pts of a course. (10pt courses may have 18-20 lecture hours, but the rest should be used for guest lectures, revision sessions, assignment feedforward/feedback, etc.)

This course focuses on computation in the nervous system. You will be introduced to basic neuroscience concepts, learn about how computational models are used to simulate processes in the brain, and learn about theories for how the brain processes information and performs computations.

Course Content:

1. Introduction to basic neuroscience concepts
2. Models of neurons
3. Neural encoding
4. Neural decoding
5. Information theory
6. Network Models
7. Plasticity/learning

The course will be delivered through lectures and computer labs.

Assessment Weightings (for DRPS)

These should correspond approximately to the proportion of learning outcomes (below) that each component assesses. Note that assessed coursework is typically more time-consuming than exams for both students and staff. A typical course is based no more than 30% on coursework and doing so requires justification.

Written Exam __75___%
Practical Exam __0___% (*for courses with programming exams)*
Coursework ___25__%

Additional Information, Assessment (for DRPS)

State briefly for students what type of coursework to expect, including whether implementation is required. E.g., "Coursework will involve implementing some of the methods discussed" or "The coursework will assess students' analysis and proof skills. No implementation is required." More specific information can be useful, but please keep it high level and do not include details that are likely to change from year to year.

Coursework will involve implementing and/or analysing/discussing in more detail material from lectures.

Learning Outcomes (MAXIMUM OF 5; for DRPS)

List the learning outcomes (LOs) of the course. These must be assessable (i.e., observable), so must specify what the student should be able to do concretely, not simply what they should "understand". Use concrete verbs that indicate (a) what type of assessment would be appropriate, and (b) what level of knowledge/thinking is expected (from recall to *analysis to novel creation).* ***Example verbs:*** *define, explain, implement, compare, justify. Assessments (described later) should be tied to the LOs.*

LOs should focus more on the types of thinking/skills developed than on the detailed course content, and should be appropriate to the level of the course: e.g., LOs at Level 11 should include more higher-level thinking skills than at Level 8. See [how to write good learning outcomes]() and the [descriptors of the SCQF Levels](). Also, please consider including LOs related to ***social or ethical implications*** *or* ***meta-skills*** *as well as technically-focussed LOs.*

On completion of this course, the student will be able to

1) Describe and critically analyse fundamental concepts and approaches to studying neuroscience and neural computation

2) Abstract neuroscience experimental data into an appropriate computational model and critically evaluate such a model from a biological and/or computational perspective

3) Given a neuroscientific problem, identify an appropriate modelling approach to that problem and compare the strengths and weaknesses of alternative modelling approaches.

4) Apply probabilistic, information-theoretic, and machine learning techniques to model neural function and evaluate the neurobiological implications of such models

5) Implement the models and methods learned in lectures and critically evaluate the results in the context of neural computation

Graduate Attributes, Personal & Professional Skills (for DRPS)

Please list the generic transferrable skills that this course will develop, as aligned with the [UoE's Graduate Attributes framework](). Examples from the four skills categories in the framework include:

Research and enquiry: *problem-solving, critical/analytical thinking, handling ambiguity, knowledge integration*

Personal effectiveness: *leadership, planning and organizing, flexibility and change management, entrepreneurship*

Personal responsibility and autonomy: *ethics and social responsibility, independent learning, self-awareness and reflection, creativity, decision-making*

Communication: *interpersonal/teamwork skills; verbal, written, cross-cultural, or cross-disciplinary communication*

Research and enquiry: problem-solving, critical/analytical thinking, handling ambiguity, knowledge integration

Communication: cross-disciplinary communication

2. Additional information on course design and resourcing (for BoS only, except where noted)

Breakdown of Learning and Teaching Activities (for DRPS)

Please fill in the number of timetabled hours per student for each type of activity. Do not include non-timetabled hours.

***A typical 10pt Informatics course** has:*

- *18-20 lecture slots (2/wk), but only ~15h should be examinable lectures, with the rest used for guest lectures, revision sessions, assignment feedforward/ feedback, etc. If unsure of plans, count these under 'lecture hours' but please explain tentative plans in the free text below.*
- *No more than 4-5 lab or tutorial hours. Please consider whether fewer can be used, e.g. by using some lecture hours for whole-class discussion/feedforward.*

***A typical 20pt course** has 30 lecture slots (3/wk) and no more than 8 lab/tutorial hours.*

Timetabled Hours	Type
16	Lecture Hours
0	Seminar/Tutorial Hours
0	Dissertation Project Supervision Hours
5	Supervised Lab/Workshop/Studio Hours
3	Feedback/Feedforward hours
2	Summative assessment hours *[Normally 2h if using an exam; otherwise 0]*
2	Revision Session Hours

(Note for ISS: Remaining hours should be allocated to Directed and Undirected Learning Activities.)

Use of timetabled activities (not to be included in DRPS)

If labs or tutorials are planned, please describe their role in the course (e.g., as support for assessed coursework, review of exercises, discussion of ethical questions, etc). If a non-standard pattern or style of lectures is planned, please explain.

Supervised computer labs will be used to implement models from lectures. Students will be encouraged to work in pairs or groups.

Summative assessment and time spent on assignments (not to be included in DRPS)

*Please describe your plans for summative assessment, in more detail than in the student-facing description: How many and what types of assessment are planned (oral presentation, report, programming, etc)? For each piece of assessment, please indicate **(a)** which learning outcome(s) it assesses; and **(b)** how many hours students are expected to spend on it.*

*Please minimize the time spent on summative assessments (for both students and markers) while robustly assessing the learning outcomes. See the School policy on Workload and Assessment, which places limits on the number of summative courseworks and time expectations: to ensure a 35-40h working week, we must limit time asked of students to **6-7h/wk in total per 10 credits, including contact hours, self-study, and coursework.***

There will be one summatively-assessed piece of coursework. This will involve implementing a model from the lectures and critically evaluating the results of the model. The assignment will be written up and submitted as a short report. This will address all learning outcomes (with the possible exception of 4, depending on the specific content of the assignment). Students are expected to spend 7.5 hours on this assignment.

Tentative plans for feedback/formative assessment (not to be included in DRPS)

Please describe your current plans for providing feedback to students: e.g. oral feedback during labs/tutorials, automarked solutions to in-lecture or online quizzes, peer feedback, etc. We also encourage submission of at least one piece of (individual or group) written work, with formative feedback emphasizing how students can improve.

Some useful guides for planning effective and efficient feedback:

- *Two short IAD web pages: Five basic principles for feedback and Tips for improving feedback*
- *EngagED in... assessment and feedback. This flyer from IAD discusses assessment **of**, **for**, and **as** learning, and includes examples of innovative approaches that could help both with scaling to large courses and with causing students to reflect on and become engaged with their own assessment.*
- *Considerable further reading is available at the University pages on Enhancing Feedback.*

Feedback sessions will be held at the end of each computer lab. The format will be a combination of peer feedback and discussion as well as instructor-led feedback. A dedicated feedback session will be held after the assessed coursework. A revision session will be held before the exam.

Decolonisation and Inclusivity (not to be included in DRPS)

*What actions are you taking towards making your course inclusive for all students, in terms of both **content** and **delivery**? Please be as specific as possible. If you are not taking any action, please justify. See suggestions and guidance here.*

Content: We will ensure that contributions to the field made by people from underrepresented groups are properly acknowledged. We will also discuss challenges in the field arising from bias in human and animal subject choices (for example, neurosexism, choice of sex in animal studies, lack of diversity in human studies, etc.)

Delivery: We will ensure all students, regardless of their protected characteristics, will be able to fully participate in the course and achieve the learning outcomes. This means, for instance, that the course materials and lectures are accessible regardless of cultural background.

Anticipated Resource Requirements

If tutorials are needed, how many students per tutors? (*Please provide your desired number, and the maximum feasible number.)*	N/A
If labs are needed, how many students per demonstrator? (*Please provide your desired number, and the maximum feasible number.)*	Desired number: 30 students per lab session (this could be done by a single demonstrator running multiple separate sessions)
Please estimate the number of hours required for marking, per student.	1hr per student (for assignment+exam)
If any other teaching support resource will be requested in order to **develop** or **maintain** the course, please provide an estimate of that here.	N/A
Do you anticipate any difficulty recruiting enough teaching support? *(For example if the course is very large or very specialized.)*	We have not experienced difficulties for these courses in the past
Does the course have any scaling limits due to available space or equipment?	Only computer labs, which are unlikely to be a limiting factor

If equipment is required, please state how it will be procured and maintained.	N/A
Does the course have any external funding? *(Typically only for CPD courses)*	No
Does the course need any special arrangements such as quotas, agreements with other schools, or registration arrangements? Does it have any atypical characteristics that may affect finance or student registration? Please specify if so.	No

3. Further information for BoS consideration

A full proposal for a new course must include examples of exercises and assessment. Please provide these below, along with publicity information.

Course information and publicity

The course web page (typically the Learn landing page) will be linked from the Sortable Course List, and information such as timetables and assignment deadlines must be made available prior to the start of the academic year. Please specify here if any additional info/publicity is needed for your course, especially if it is aimed largely at non-SoI students.

This course does not require additional info/publicity.

Sample tutorial/lab sheet questions

Provide a list of tutorial questions and answers and/or samples of lab sheets. These need not be fully fleshed out but should indicate what sort of exercises will be provided to help students learn the material.

Extensive tutorial/lab sheet questions can be found on the previous course webpages (https://www.inf.ed.ac.uk/teaching/courses/nc/ and https://www.inf.ed.ac.uk/teaching/courses/nip/). Examples: simulate an integrate and fire neuron and analyse the spiking statistics; implement a Hopfield network and study the storage and retrieval properties; analyse natural image statistics and relate to neuro-inspired models such as sparse coding and ICA.

Sample assessment materials

*If the course is primarily assessed by **exam**, provide a sample exam question with model answers. The online list of past exam papers gives an idea of typical and alternative exam formats.*
*If the course is largely or primarily assessed by **coursework**, provide a sketch of a possible assignment with an estimate of effort against each sub-task and a description of marking criteria.*

There are extensive past papers and assessments for NC and NIP on which this course builds. Below are example questions from NC and NIP in 2019. As suggested by the reviewers and in line with the updated learning outcomes, for CNS we will modify these styles of questions in order to more strongly emphasise critical thinking and depth of understanding and reduce the emphasis on memorisation and calculation.

2. (a) Describe a simple model of the spatial receptive field of a retinal ganglion cell. State the relevant equation. What aspects of visual stimuli are encoded by this receptive field, and why is this encoding advantageous? [5 marks]
(b) Describe the method to estimate the linear spatio-temporal receptive field of a visual neuron. Can this method be used to map the receptive field of an On-Off retinal ganglion cell? Justify your answer. [5 marks]
(c) Explain the structure of a model that extends a linear receptive field model to include a non-linearity. What aspect of neural function does the non-linearity account for? Which cell class in primary visual cortex can only be modelled using the linear-nonlinear model? [3 marks]
(d) Explain the concept of tuning curve in V1 neurons (give equation). How is it measured experimentally? [4 marks]
(e) What are the two main theories/models regarding the emergence of orientation selectivity in V1? [4 marks]
(f) Supposing you have all possible techniques you can think of available, how would you test the two models in part (e) experimentally? Suggest at least

two types of experiments that could be done (or potentially have been done) to try to disentangle the two models. [4 marks]

2. We can use a linear-nonlinear-Poisson (LNP) model to describe the neural encoding process.

(a) Describe the linear, nonlinear and Poisson stages that define this model (give equations). [5 marks]

(b) Summarise which parts of the model are fixed, and which ones are, or can be chosen to be, model parameters. List the parameters of the model that have to be optimised when fitting a recording from a neuron in the visual system. [4 marks]

(c) Are there any conditions in this model that would lead to local minima during optimisation? If so, what are they, and why? [3 marks]

(d) Explain why a model with Poisson statistics is particularly suitable to model neural responses. Are there any other suitable statistics? Explain why the LNP model might be preferred over a linear model. [4 marks]

(e) With a small extension the LNP model can capture the essential behaviour of a spiking neuron. Describe this extension and explain which phenomenon it attempts to capture that is absent in the original LNP model. Does this extension require a different method for parameter inference? [4 marks]

(f) Neurons higher in the visual system integrate the activity of multiple retinal or cortical neurons. Is the LNP model sufficient to model these neurons? If not, suggest an extension to overcome this limitation. [5 marks]

Any other relevant materials

Include anything else that is relevant, possibly in the form of links. If you do not want to specify a set of concrete readings for the official course descriptor, please list examples here.

4. Additional Course Details for DRPS

Except where otherwise noted, these fields are required for entry into EUCLID and will be visible to students in the DRPS entry.

Planned Academic Year of Delivery *(The first year you anticipate the course running, e.g. AY 2019-20)*	AY 2022-2023
Keywords *Give a list of searchable keywords for the course.*	Neuroscience, Cognition, Biology, Computational Model, Brain
Course Organiser *(By default, the course proposer)*	Angus Chadwick
Intended Delivery Period	__X_Semester1 ___Semester 2 ___Full Year ___Summer ___Other (please specify):
Timetable considerations/conflicts *For School use. Please specify any constraints to be considered (e.g. overlap of popular combinations, other specialism courses, external courses etc). Include whether the semester delivery is constrained or could be flexible.*	Students may also take cognitive courses such as CCS, AI courses (IAML, MLPR), or bioinformatics courses (BIO1). This course is best placed as an S1 course (before CCN in S2).
Reading List/Learning Resources (for DRPS) *You are encouraged to create resource lists using LEGANTO*	Theoretical Neuroscience (Dayan and Abbott) Neuronal Dynamics (Gerstner)
Feedback Information *Provide a high-level description of how and what type of feedback will be provided to students, for inclusion in DRPS.*	Oral feedback will be provided in tutorial/lab sessions. Written feedback will be provided on the assignment, and an additional oral feedback session will be scheduled if there is sufficient demand.
Is this course available to visiting students?	_X__Yes (default) ___No **If no, please provide a justification here:**
Required pre-requisite courses *Use sparingly: these are enforced in PATH and can only be waived by approval from the School's Curriculum Approval Officer. Note that cross-year required pre-requisites may prevent MSc students from registering; consider using recommended pre-requisites or "other requirements" instead.*	_X__No ___Yes (please specify full course name(s) and code(s)):

Recommended pre-requisite courses	_X__No ___Yes (please specify full course name(s) and code(s)):
Required co-requisite courses *Specify any courses that must be taken in parallel with the existing course. Note that this leads to a timetabling constraint that should be mentioned elsewhere in the proposal.*	__X_No ___Yes (please specify full course name(s) and code(s)):
Prohibited Combinations *Specify any courses that may not be taken in combination with the proposed course].*	_X__No ___Yes (please specify full course name(s) and code(s)):
Other Requirements/Additional Information *This information is often used by MSc students and students from other Schools to see if they have appropriate background without having done our School's courses. So please avoid course titles, instead list specific knowledge and skills (such as mathematical concepts, programming ability or specific languages, etc).* *Also list any other constraints on registration, for example: "Only available to 4th Year Informatics students including those on joint degrees." or "This course is open to all Informatics students including those on joint degrees, and to students in the School of Mathematics. Other external students whose DPT does not list this course should seek permission from the course organiser."*	___No __X_Yes (please specify): No prior biology/neuroscience knowledge is required. This course requires knowledge of linear algebra, calculus, probability and statistics. In particular, we assume familiarity with vectors and matrices (including matrix inverse and eigenvectors), special functions (logarithm, exponential), integration and differentiation of basic functions, the Taylor expansion, probability distributions (Poisson distribution, univariate and multivariate normal distribution, exponential distribution), expectation and variance of random variables, and Bayesian inference (prior and likelihood, joint and conditional distributions, Bayes rule). We will make use of simple linear differential equations, but prior experience of these is not a prerequisite. Some basic physics concepts will be used (e.g., voltage, capacitance, resistance) but prior knowledge is not required. Basic programming skills (e.g. in Python+NumPy or in Matlab) are required for the tutorials and assessments.
Visiting Student Pre-requisites	_X__Same as "other requirements" ___Different than "other requirements" (please specify):

5. Placement in degree programme tables: for level 9-11 courses only (except EPCC)

This section is for consideration by the Board of Studies and will be used later by ITO to determine where the course will be added to existing degree programme tables.

Is this course restricted to students on a specific degree? *E.g., some courses are only available to students on a specific CDT or MSc.*	_X_No ___Yes (please specify and provide justification):
Is this course compulsory for students on any degree(s)?	_X_No ___Yes (please specify and provide justification):
Any issues for part-time students? *Normally, part-time students have access to the same courses as full-time students on the equivalent degree. If you anticipate any problems with this, please specify here.*	None

For optional courses:

If this course is available but non-compulsory for students on various degrees (most courses), please fill in this section. The choices here determine where the course appears in degree programme tables (DPTs) and the 2-3 character tags are displayed in the Informatics sortable course list.

Should this course be tagged as 'ML' (machine learning foundations and methods)? *Courses with the ML tag are typically very high-demand and most degrees limit the number of ML credits. If your course might appeal to a similar audience but draw off students from these large courses, please select 'no' and choose one of the tags below.*	_X_No __Yes
If you chose 'no', please choose at least one of the following tags… *Ideally, select exactly one, unless there is a good argument for more than one. These three are used in various combinations for many of our degrees.*	__**FSS** (CS foundations, systems, and software) __**AIA** (artificial intelligence applications and paradigms) _X_**COG** (cognitive science: including HCI and NLP courses, but not most other AI courses. Please restrict to courses most relevant to natural cognition.)
…and also tick if any of the following tags or categories apply. *Do not tick any of these if you selected 'ML' already.*	__**SE** (software engineering: including courses that are highly relevant to SE degrees. All SE courses should also be FSS. This tag is mainly relevant for UG SE degrees.) __Databases and data management systems (used for Data Science MSc and MSc(R)) __Unstructured data and applications (used for Data Science MSc and MSc(R)) __Level 11 Security courses (used for Security MSc) __ATFC Optional courses (used for ATFC MSc)

If you are not sure which tags are most appropriate or have other questions about this section, please note any comments/issues here.	This course has some peripheral relevance to AI (but no direct applications)