

# School of Informatics Teaching Course Proposal Form

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## Proposal

**Course Name:** Advanced Topics in Cyber Security and Privacy

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**Course Year:** 4

**Names of any courses that this new course replaces :**

None

## Course Outline

**Course Level:** 11

**Course Points:** 10

**Subject area:** Informatics

**Programme Collections:**

Computer Science.

## Teaching / Assessment

**Number of Lectures:** 11

**Number of Tutorials or Lab Sessions:** 11

**Identified Pre-requisite Courses:** Computer security, Introduction to Modern Cryptography

**Identified Co-requisite Courses:** None

**Identified Prohibited Combinations:** None

## Assessment Weightings:

**Written Examination:** 0%

**Assessed Coursework:** 60%

**Oral Presentations:** 40%

## Description of Nature of Assessment:

In keeping the seminar nature of the course, there will be no exams. The evaluation scheme for courses like ATFD works much better with this type of courses. Students will be required to read papers, present papers, write essays on a topic related to one of the seed papers, and complete a small project. More precisely, the students will deliver their work in three instalments:

1: one oral presentation of one of the seed papers

2: one essay on a topic related to one of the seed papers - summary of the paper, and analysis of (critical thoughts on) the paper

3: a small project related to one of the seed papers1 - add a new contribution done by the student to the selected paper. This could be

- An implementation of a theoretical algorithm with performance analysis
- An extension of some of the results to cover new cases
- An improvement for an existing solution, perhaps under some restrictions
- etc. (the list is not exhaustive)

## Course Details

### Brief Course Description:

The course will cover advanced topics in Cyber Security and Privacy. The course aims to develop a deep understanding of current computer security and privacy research. By exposing students to current research and developments in connection with Cyber Security and Privacy, the course will prepare them for conducting research in this area. The course will focus on fundamental and advanced topics in important areas of modern information security: Access control and authorisation, Anonymity and privacy, Application security, Attacks and defences, Authentication, Blockchain, Cryptography, data and system integrity, database security, decidability and complexity, electronic voting, formal methods and verification, Distributed systems security, Hardware security, Malware and unwanted software, Mobile and Web security and privacy, Language-based security, Network and systems security, Privacy technologies and mechanisms, Protocol security, Security and privacy for the Internet of Things, Security architectures, Usable security and privacy, etc. The course content is dynamic and continuously updated to cover the state-of-the-art in cyber security and privacy theory. The course is intended to be offered to MSc students (and 4th year students). As a level 11 course, we would expect a computer science background, but would also require students having taken courses similar to our Introduction to Computer Security, and Introduction to Modern Cryptography. The course will require an allocation of an equivalent of 11 two-hour lecture slots in total. The nature of the course will be very research seminar like. There will be a list of of fundamental topics to be covered during the semester. These will be covered through a collection of seed research papers related to each topic. During each (two-hours) lecture, three students will each present one of the selected papers which will then be discussed by the class. The course will target MSc students. Primarily, students taking this course will be inclined towards cyber security and privacy issues. Due to the format of the course, there is a natural cap on the number of students that can be enrolled in the course. Each two-hours session will host three student presentation, so the maximum capacity for this course is 30 students. Given the theory nature of the course, no computing resources will be required. The course lecturer(s) will point to current research work. There will be need for standard teaching support in the form of a teaching assistant to help in shaping up the various topics chosen by the student, potentially answering some of their questions during the development phase of their projects, and marking essays.

### Detailed list of Learning Objectives:

- 1: Demonstrate detailed understanding of some of the fundamental aspects of cyber security and privacy.
- 2: Develop ability to critically evaluate the literature related to their chosen topic, and to formulate academically-informed views on a range of security issues.
- 3: Demonstrate an understanding of theories and techniques for detecting and defending against a range of security and privacy threats. The course emphasises on the technical material.
- 4: Demonstrate ability to approach an open-ended topic, to research new ideas and experiment with new techniques. Complete a project that contributes in an original way to an established area of research or development.
- 5: Developed skills of written and oral argument within a small group setting. Write a project according to a standard that would be acceptable for wider publication. Report and present the project. The oral presentation should accurately summarise their work.

### Syllabus Information:

TBD

### Recommended Reading List:

List of seed research papers provided by the lecturer

### Any additional case for support information:

To be either a professional or a researcher in the area, it is necessary to understand fundamental issues in connection with cyber security and privacy. The course will fill a gap in the current curriculum. While three courses are related to security and privacy, none of the courses offers a comprehensive coverage of fundamental challenges in the field.

There is a strong push from central government for research and teaching in Cyber Security, as part of the national UK Cyber Security Strategy. We are hoping to introduce a dedicated MSc programme which could be popular, but this requires new courses such as this one. Also, we have just been CONFIDENTIALLY informed that our application for the GCHQ/EPSRC accreditation as Academic Centre of Excellence in Cyber Security Research. This will very probably drive students with interest in Cyber Security and Privacy to us, but we would need courses as the proposed one for them.