Imperial College
London

331 – Network and Web Security

0. Introduction

Dr Sergio Maffeis
Department of Computing
Course web page: http://www.doc.ic.ac.uk/~maffeis/331

About me

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- PhD from Imperial in 2005
- 8 years of EPSRC Research Fellowships
- Deputy director of UK RI on Automated Program Analysis and Verification (2013-2017)
- Currently:
  - Senior lecturer in Computer Security
  - Coordinator for Erasmus and International students
- Recent research relevant to the course
  - http://jscert.org: JavaScript semantics in Coq
  - http://phpsemantics.org: PHP semantics in K, model checking
  - http://defensivejs.com: type checker for secure APIs on untrusted web pages
  - WebSpi: verification of web apps using applied pi-calculus
  - https://browseraudit.com: automated testing of browser security mechanisms
  - **Impact**: we found new attacks in lots of important web apps (Twitter, Facebook, Yahoo, Firefox, BlackBerry, …) and helped making them secure
- Ask me about PhD opportunities in security and formal methods at DOC

About you

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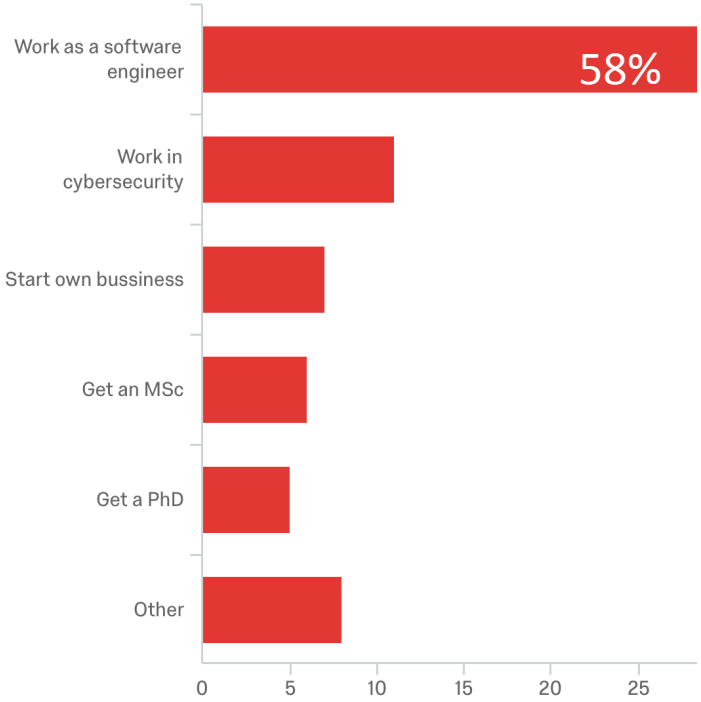
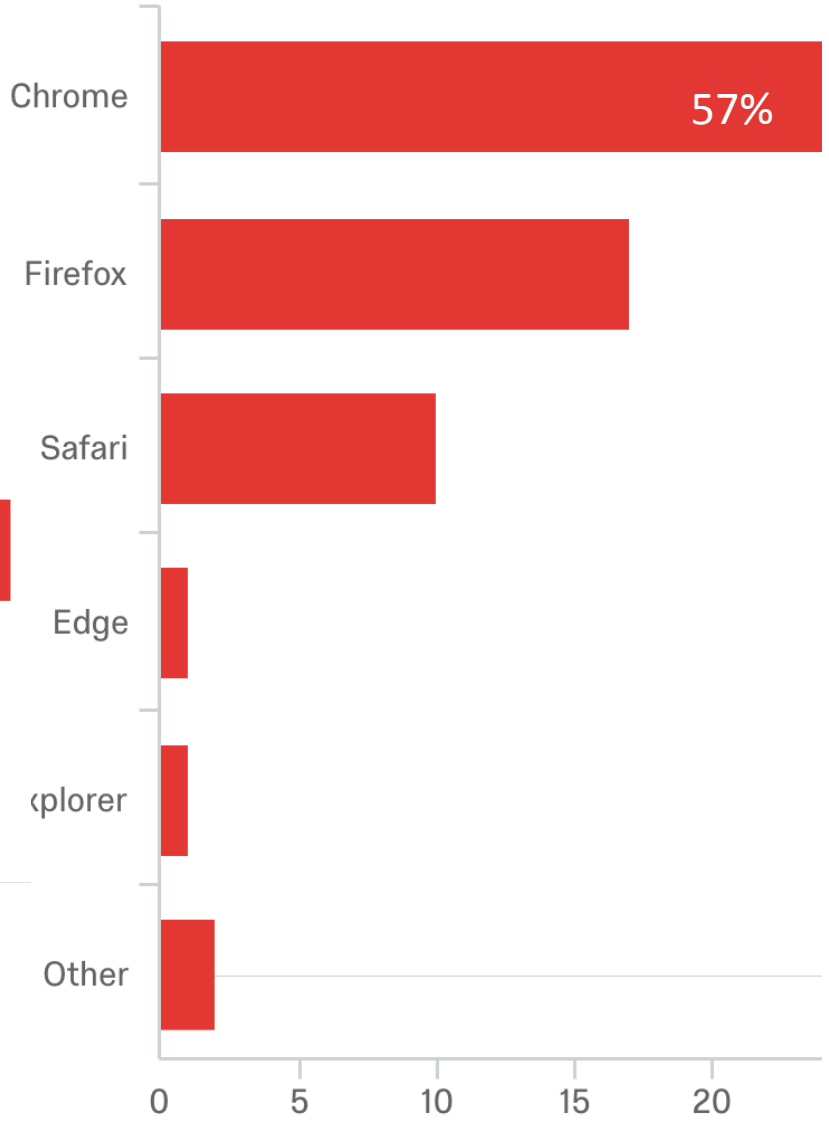
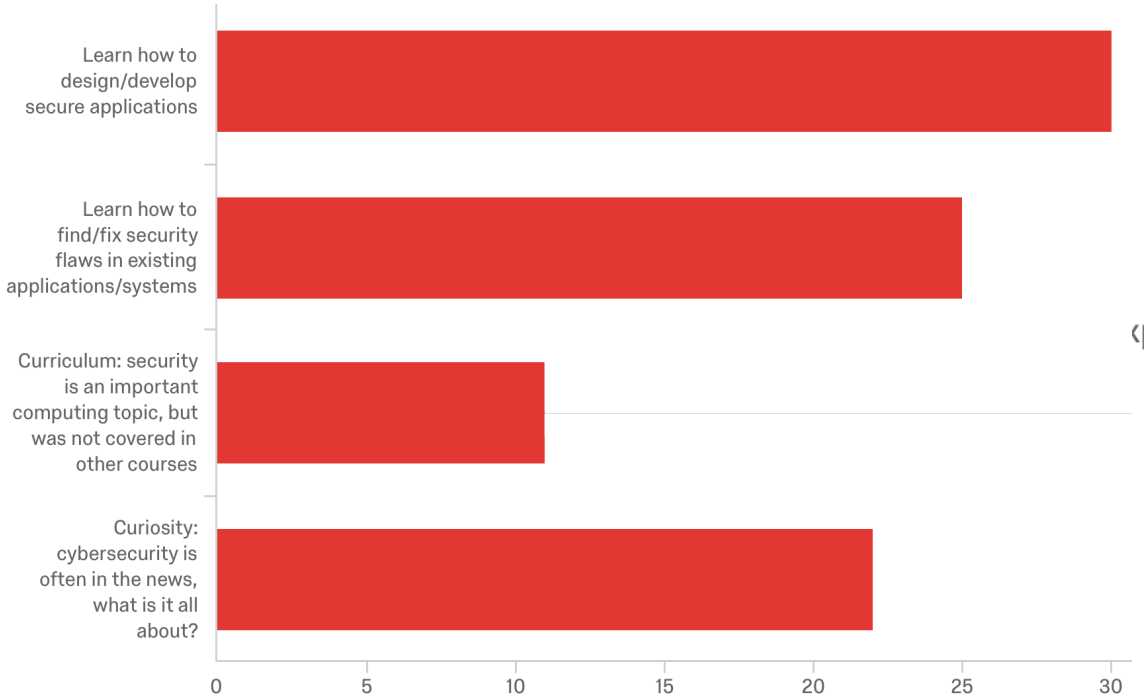
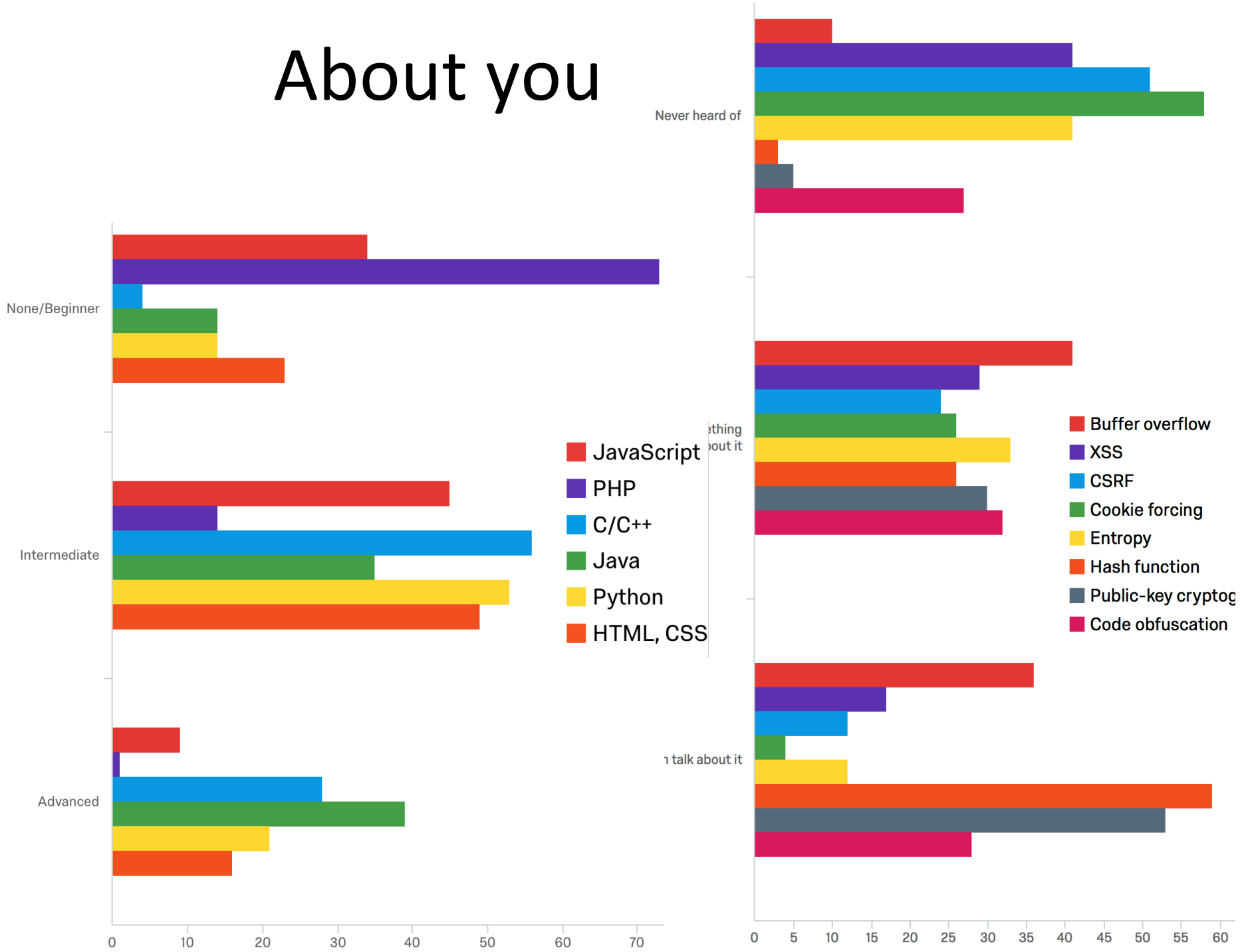






About you


None/Beginner
Intermediate
Advanced
0
10
20
30
40
50
60
70
JavaScript
PHP
C/C++
Java
Python
HTML, CSS
Never heard of
thing
out it
talk about it
0
5
10
15
20
25
30
35
40
45
50
55
60
Buffer overflow
XSS
CSRF
Cookie forcing
Entropy
Hash function
Public-key cryptog
Code obfuscation

Main course topics

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- Vulnerabilities
- Threat modelling
- Code review and pentesting
- Malware
- Network security
- Web application security: server-side
- Browser security
- Web application security: client-side
- Secure sessions and authorization
- Privacy, fingerprinting and tracking

Course overview

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- Focus: long-standing security principles, practical attacks
- Learning outcomes
  - Sustain a conversation on cybersecurity
  - Describe main network and web security threats
  - Identify vulnerabilities, propose countermeasures in realistic systems/ applications
  - Design secure web apps by leveraging security principles
- Final exam
  - You will use pre-configured desktops in the lab
  - Each exam question will be roughly half written, half practical (3 our of 4, 3h)
  - You will submit the written answers electronically via a web app
  - You will perform practical tasks such as code review, pentesting, etc on VMs that you will find installed on your machine
- Pre-requisites
  - Must have familiarity with computers, the web
  - Must be able to program confidently in a “serious” programming language
  - Beneficial to have some general knowledge of networks and distributed systems

Resources

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- On CATE
  - Lectures slides, published the evening before
  - Tutorial and lab assignments
- Training VMs
  - Work in the labs, but ou may want to use laptop or USB3 stick
- Reading list
  - There are no proper textbooks on this subject
  - General resources (web pages, papers, books, lab material) on the course webpage
  - Recommended reading added with each lecture
- Your own initiative
  - Find other online resources
  - Do practical experiments based on examples and demos

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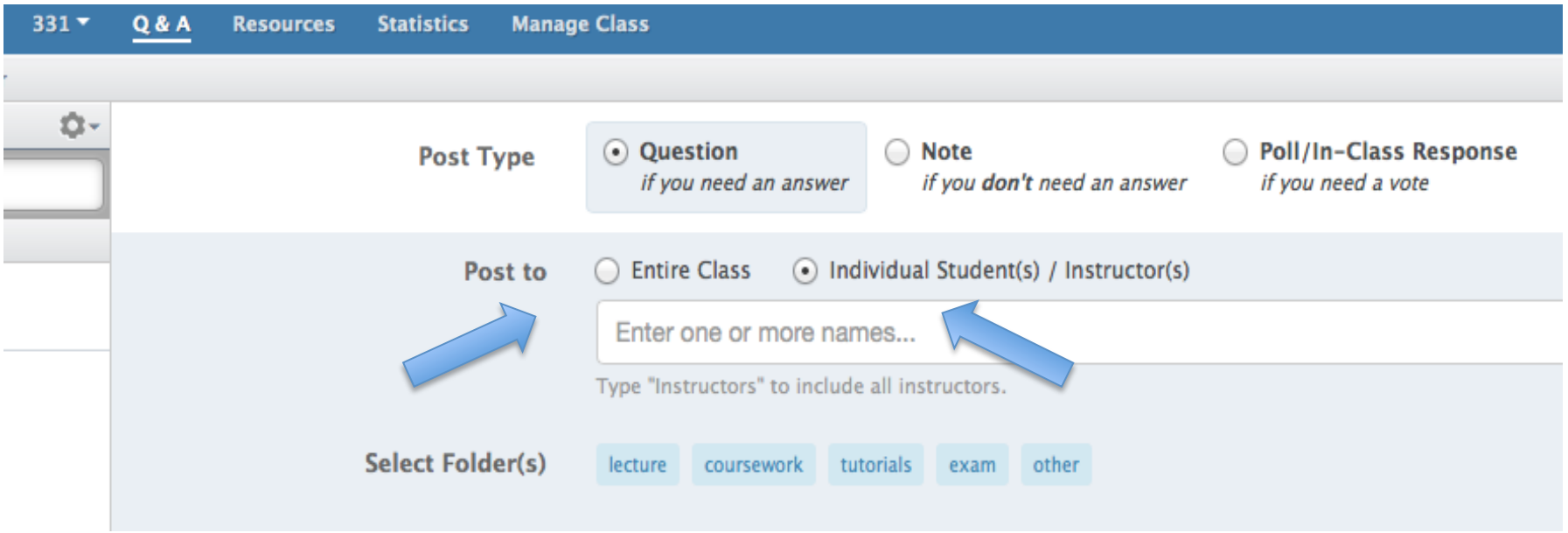
- Lecturer: **Sergio Maffeis**
- Tutorial helpers: **Abdulrahman Alsaleh, Federico Morini, Giulio Zizzo**
- Guest lecturers: **Marco Cova, Ibrahim ElSayed, Charlie Hothersall-Thomas**
- Web page: http://www.doc.ic.ac.uk/~maffeis/331
  - Announcements, schedule, links, reading material…
- Piazza page: https://piazza.com/imperial.ac.uk/spring2018/331
  - All course-related questions and enquiries should go here: no direct emails
  - You can ask private questions to instructors if needed
  - Share with entire class if it is of general interest



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- Schedule
  - Lectures & tutorials: Tue 11am-1pm and Fri 4pm-5pm in Hux 311
  - Labs: Fri 5pm-6pm (**1st session on 26/1**) in Hux 219
  - Office hours: Thursday 5pm-7pm in Hux 441
  - Assessed coursework will be issued on 20/2, deadline 1/3, marked by 8/3
  - Final exam on 21/3 at 2pm in Hux 219
- Feedback
  - Any kind of honest, constructive feedback is very welcome
  - Please answer various surveys to impact this year course
  - Fill in SOLE at the end, we act on feedback & improve for next year
- In class
  - You're welcome to bring a laptop
  - Please participate: it's valuable for all of us
- Lectures are **NOT** recorded on Panopto
  - Please don't ask!
  - Recording is not suitable for some of the content of this course

Admin – external students

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1. Apply at: https://dbc.doc.ic.ac.uk/externalreg/
2. Then,
   - Your department's endorser will approve/reject your application
3. If approved
   - DoC's External Student Liaison will approve/reject your application
4. If approved (again),
   - Students will get access to DoC resources (DoC account, CATE, ...)
   - No access after a few days? Check status of approval and contact relevant person(s)

- Key Dates:
  - Exam registration opens end January for 2-3 weeks
  - Exams for DoC 3rd/4th yr. courses this year take place between the 19th and 23rd of March
  - Courses that are co-scheduled on the time-table will have their exams co-scheduled, so avoid conflicting courses
- If in doubt, read the guidelines available at the link above