



## Software Engineering: Information for Mentors

October 2016

### Dear Mentor

Thank you for volunteering to join our Industry Mentoring Scheme for the 2016/2017 academic year. Our students are excited about this new scheme, and are looking forward to meeting you and learning from you. As academic staff, we are grateful for the time and expertise you will be bringing to our undergraduate programmes.

This short document provides you with some basic information that we hope will be helpful to you in preparing for your first meeting with your team.

More details can be found at <http://www.cs.manchester.ac.uk/industry/mentoring/>

### About the School of Computer Science

The School of Computer Science at the University of Manchester is one of the oldest in the UK. The first stored-program computer was developed here in 1948, by the academics who would go on to found the School, followed by the first floating point machine, the first transistor computer and the first computer to use virtual memory. This history of innovation continues today with cutting-edge research projects like SpiNNaker (part of the Billion Euro Human Brain Project) which is currently building a million core ARM-powered neural High Performance Computer (HPC).

In the most recent government ranking of all research across the UK, the School was ranked 4th in the UK (based on GPA), and was assessed as having the best environment in the UK for computer science and informatics research.

Since awarding the first undergraduate degrees in Computer Science in 1965, the school has awarded 10,000 degrees in Computer Science at Bachelors, Masters and Doctoral level. Our students are sought after by employers, and are active (and successful) in taking part in major coding competitions and hackathons.

### About the Course Unit You Will Support

The course unit you have volunteered to support is our second year compulsory course on Software Engineering (course code COMP23420). This is a year-long course unit that is taken by students on all of our undergraduate programmes. For this first year, we are introducing the mentoring scheme for just the second semester of the course, which runs for 11 weeks from February to May, with a 3 week break in the middle for the Easter vacation.

In the first semester, the students have been learning about requirements gathering techniques (such as interviewing skills and modelling) and some basic software design. In the second semester, we are focussing on the skills and expertise needed to be able to work with a large body of code. Students will gain experience of fixing bugs in code written by other people, adding new features to code without breaking the existing functionality, and making larger scale architectural changes to improve non-functional properties of the system - all while keeping the system up and running for its users.

For the 2016/7 academic year, we have a cohort of **212 students** taking Software Engineering. They have already worked on individual assignments in the first semester, but in this semester, they will be working in teams of 5 or 6. They will undertake 3 team-based coursework assignments across the semester, as well as keeping an individual reflective journal focussed on developing their personal software process, and a final examination in the summer.

As well as learning about the academic discipline of software engineering, students take this course unit to gain key employability skills, to prepare them for interviews for industrial placements and graduate positions, and to allow them to hit the ground running when they do start work.

## About the Mentoring Scheme

As a mentor, you are asked to visit the University on two separate occasions, to work with a team of students for around an hour each time. The visits take place in specific weeks, during time when the teams are scheduled to be working on their Software Engineering coursework. The dates/times for the visits are described in the eventbrite invitation you have received.

The first mentoring session is an hour long in the Kilburn building where you will meet the team of six students you have been assigned. The second session can either be in Kilburn again or you might like to invite your team (and any other students) to your workplace for a quick tour and discussion of how their projects compare to work in your organization.

## What to Do on the Day

The mentoring sessions will take place in the Kilburn Building, on Oxford Road. You can find maps and directions for getting there on our Web pages at <http://cs.manchester.ac.uk/about-us/find-us>

If you are travelling by car, and need a parking space, please email Mabel Yau ([mabel.yau@manchester.ac.uk](mailto:mabel.yau@manchester.ac.uk)) 2 days before your visit, so that we can make the arrangements and send you the details of which car park to use. The nearest car park to the School is the Manchester Aquatics Centre NCP car park on Booth Street East (postcode M13 9AJ), but you will have to pay (currently £2.40 for 2 hours of parking) as we are not able to reserve parking spaces in that particular car park.

Inside the building, you'll find a Mentor Welcome Desk and a teaching assistant waiting to allocate you to your team, and help you find your way around. Please arrive 5-10 minutes before your mentoring session is due to begin, so that we can allocate teams to mentors in good time.

## Ice Breaker Questions for Mentors

Below are some questions you can use to get the discussion started.

Finding out about the team:

- What degree programme are you studying?
- What ideas do you have about your career?
- What interests you about computers/building software?
- Are you thinking of doing an industrial year, or a summer placement?
- What is the largest piece of software you have built/worked with so far?

Challenging and guiding the team:

- What are you working on at the moment?
- How are you coordinating work within your team?
- What sorts of challenges are you facing at the moment?
- What team working issues have you faced so far?
- How did you divide the work between the team members?
- How do you think your team is performing?
- Are you on target to meet your next deadline? If yes, how do you know that?

## Questions the Students Might Ask You

We will provide the students with this list of suggested questions that they could ask their mentors. You might find it useful to look over the list, ahead of the session. Of course, students are free to ask questions that are not on this list, as well.

Questions about the mentor:

- Can you give a brief overview of your career up to this point?
- How did you get into the job you are doing today?
- What do you enjoy about your current role?
- Was there anything that surprised you about working in industry compared to being a student?

Questions about employability:

- What skills do I need to be competitive in job applications?
- What skills do you look for when you are hiring people?
- What do you know now you wish you'd known as a student?
- What are the current trends in software development?
- What up-and-coming topics do you recommend we should know about?
- What can I do to make my CV stand out when applying for placements/jobs?

#### Questions about team-working:

- How do you resolve technical disagreements in development teams?
- How do you deal with personality clashes within your team?
- How do you encourage people to recommit to the team?
- One of our team members isn't contributing. Would this happen in industry? How would you resolve these problems?

#### Questions about the process of developing software:

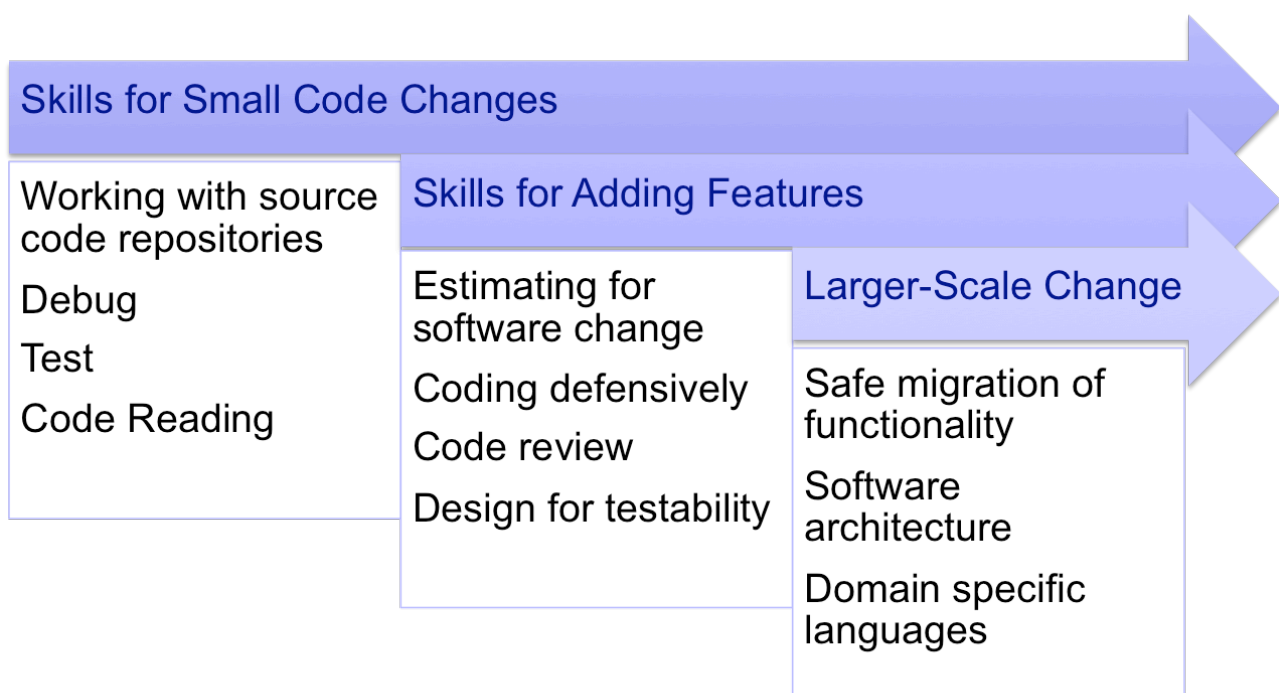
- What processes/methodologies do you use in your company?
- What software tools do you use and why?
- What process do you use to release software in your company?
- What code review practices do you use?
- How big is the software system you are working on now?
- What techniques do you use when working with code written by other people?
- How can we avoid getting into a mess when using Git (or other version control systems)?
- We're having a lot of trouble fixing this bug/making this change? Do you struggle with this too? How would you go about dealing with this sort of problem?

#### **Who are the mentors?**

As of 2016, mentors have been recruited from members of our industry club, most of them based in the North of England. We are particularly grateful for past and current contributions to the mentoring scheme from ARM, Avecto, the BBC, CDL Software, Code Computer Love, DataCentred, Digital Bridge Ltd, Farm Digital, IBM, Imagination Technologies, Morgan Stanley, NCC Group, On The Beach, Rental Cars, Sage Group plc, ThoughtWorks, Web Applications UK and Zuhlke. More information on our industry club, a large and varied group of employers who recruit our students, can be found at <http://www.cs.manchester.ac.uk/industry/club/>

### More details on the software engineering syllabus

The unit COMP234 is split into 11 semesters as shown in Figure 1 and Table 1 below. The mentoring sessions occur in week 4 and week 8 (with an optional showcase for mentors to attend in week 11)



**Figure 1:** An overview of the course described more in the table below. As students progress through the course the scale of the changes they make to the code increases.

Week	Topics covered
1	Introduction: Greenfield and Brownfield software development. Why we are teaching software engineering differently, talks from students returning from placement
2	Building and testing an open source system. Acquiring source code, compiling & building code, using an IDE (Eclipse) for the first time
3	Understanding large software through tests. Code comprehension, unit testing, learning unfamiliar codebases, test coverage
4	Git workflows for software quality: Popular workflows used in git and other version control systems
5	Cost estimation for software projects: estimating how long it will take to complete
6	Design for testability
7	Design patterns and defensive coding
8	Safely migrating software functionality

9	Software architecture design
10	Domain specific languages
11	Project showcase

**Table 1:** an overview of course content over the 11 week course, which includes a three week break for the easter vacation

### Contacting us (teaching staff)

Suzanne Embury is the course leader for the second year software engineering course. If you'd like to contact academic staff about the course, contact details are below :

- Dr. Suzanne Embury (Senior lecturer) <http://www.cs.man.ac.uk/~embury/>
- Dr. Duncan Hull (Lecturer) <http://www.cs.man.ac.uk/~hull/>
- Robert Haines (Honorary Lecturer) <http://software.ac.uk/fellows/robert-haines>
- Dr. Caroline Jay (Lecturer) [www.cs.man.ac.uk/~jayc](http://www.cs.man.ac.uk/~jayc)
- Dr. Steve Pettifer (Reader) <http://aig.cs.man.ac.uk/people/srp/>
- Dr. Markel Vigo (Lecturer), <http://www.markelvigo.info/>

We will gather feedback from mentors and students, formally and informally, during and after the course but if you have any comments or suggestions please feel free to get in touch with any of us.