INFO1111 - Group 46

Bachelor of Advanced Computing Software Development Major

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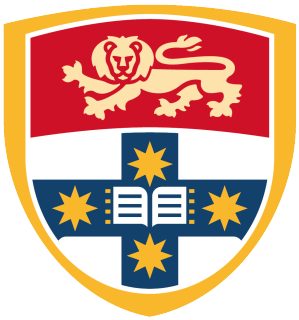

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CHAPTER 1

Overview of the major

1.1 Software development

Software development is the study of how software systems are created and it heavily emphasizes teamwork within a project as its members will be required to be able to manage the project, test the software as conduct quality assurance to ensure that the product runs efficiently. Steps of software development generally consist of planning ideas and rough drafts about the product, designing the solutions and structures of the software product, developing it, applying it in the final product and finally, maintaining the product. In addition to programming languages, soft skills such as teamwork, communication as well as problem solving skills are highly sought after in graduates of the software development major. [**10**]

CHAPTER 2

Overview of the timeline and courses of the major

2.1 Courses of the major

Year	Semester 1	Semester 2
1	MATH1021 (Calculus of one variable) MATH1002 (Linear algebra) DATA1001 (Foundations of Data Science) INFO1110 (Introduction to Programming) INFO1111 (Programming Professionalism)	MATH1064 (Discrete maths) ELEC1601 (Introduction to Computer Systems) INFO1112 (OS & Network platforms) INFO1113 (Object-Oriented Programming)
2	INFO2222 (Usability & Security) COMP2123 (Data Structures & Algorithms) Elective Elective	SOFT2201 (Software construction & Design) ISYS2120 (Data & Information Management) SOFT2412 (Agile Software Development Practices) Elective
3	SOFT3202 (Software construction & Design 2) INFO3333 (Management) Elective Elective	SOFT3410 (Concurrency) SOFT3888 (Software Development Project) Elective Elective
4	INFO4444 (Computing for Innovation) INFO4001 (Thesis A) Advanced Elective Elective	INFO4002 (Thesis B) Advanced Elective Elective Elective

2.2 Evaluation of interesting courses

- SOFT3888 - Software Development Project : Focuses on shaping and creating various software system in application software. This unit also focuses heavily on teamwork and collaboration among teammates as they will have to conduct several tasks such as planning, designing, implementing and testing code as well as documenting their activities.
- SOFT3410 - Computer Science Project : This unit teaches students to tackle the challenges of the evolving manufacturing industry as well as the evolution of hardware and software of computers. Thus, students will be required to develop and test software, as well as create progress, in order to overcome such challenges.
- SOFT3202 - Algorithm Design : This unit builds on the progression of SOFT2201. It focuses on the validation of software as well as constructing various deigns of software.
- SOFT2201 - Operating Systems Internals : The main focus of this unit consists of object-oriented programming, modelling software as well as various design principles. This unit emphasizes on understanding the theoretical concepts of software construction and design.

Software development puts heavy emphasis on collaboration and teamwork in comparison to the other majors. Group members are generally expected to cover theoretical and practical concepts such as object-oriented programming, design software as well as functional programming in order to be able to design, plan create, implement and test their software.[**5**]

CHAPTER 3

Expected career path

Various types of careers that aspiring software developers can apply for include:

3.1 Types of roles available

- Quality Assurance Analysts Quality Assurance analysts assist in testing websites and software by creating test cases and then identifying them for issues and bugs, documenting them and then working together with software developers to report any issues that exist in the program, and ensure the developers will fix the bugs.After the testing is done and the QA analysts deem the program be bug-free, the program will then be released.
- Web Developer Website developers are involved in developing applications for websites as well as coding its functions based on the clients specifications. They also help track the traffic going in and out as well as the loading time of the web pages, ensuring they run smoothly. Web developers must have knowledge of user interface as well as cross browser compatibility to ensure the websites can work in different browsers. Website developers collaborate with website designers to ensure the websites are implemented correctly, but designed well.[**12**]
- Software Architect A software Architect heavily focuses on designing user interface as well as the structures of software systems using architecture patterns to design a set of systems. Software architects assist in creating a client to Database and user interface, enabling creating a user interface.Examples of systems with software architecture include Google, Yahoo Shopping as well as Microsoft Office.

The job market for software developers is fairly solid as there has been a 30.7 percent employment growth for individuals seeking to be software developers in 2016. In addition, the employment of software developers is predicted to increase at 24 percent from 2016-2026. The annual salary has been reported to be 106,710 dollars in the united states. While the computing theories and practical applications of object oriented programming are similar to Computer Science, a high majority of the software development jobs focus on working together with other software developers in order to ensure that the final software product is well designed, tested and implemented.

3.2 Differences and Similarities between majors

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3.2.1 Similarities

- All three majors require technical skills such as knowledge of different programming languages such as Python, Java, Ruby and C, basic knowledge on computing theories as well as knowing how to implement and apply the skills.
- All three majors require its partakers to design, develop, implement, run and test software and programs in order to solve problems and adhere to the assignment's specifications.
- All three majors require various soft skills, such as being able to communicate and transmit knowledge and ideas to clients and group members, having sufficient problem-solving skills as well as having initiative and decision making skills.[**10**]

3.2.2 Differences

Computer Science

- Computer Science emphasizes heavily on Math and logic and requires partakers to learn and understand computational systems as well as computation theory. They generally focus on processing, communicating and securing data.
- Computer Scientists generally test research new theories and create algorithms related to computation. Algorithms are often designed and created as well as evaluated and adjusted based on Time Complexity.
- Computer Science also delves into both applied and abstract concepts such as artificial Intelligence and Machine Learning as well as utilising mathematical models to solve problems.

Computational Data Science

- Computational Data Science heavily focuses on utilising mathematical and analytical skills in order to construct decision-making systems based on data.
- Data Scientists are required to be able to interpret, manage and understand data sets. In addition, they are generally expected to do a lot of research and field work in order to collect, wrangle and handle large data sets.
- Technical skills required for data science include data mining, data visualisation as well as being able to communicate key ideas and analysis from the data sets.

Software Development

- Software development consists of creating, analyzing and maintaining software in order to adhere to the clients specifications.
- Software development has a more practical approach to programming in comparison to computer science as it generally requires its partakers to work together with other software developers.
- Software developers are often required to conduct project management, quality assurance testing as well as technical controls in order to be able to develop software in accordance to specifications.

3.3 Skills and tools needed for success in these roles

Graduates of software development require coding skills of different programming languages such as python, sql, Java, C, Ruby etc... as they require theoretical concepts of computing in order to plan, design, run and test software development projects. In addition, Soft skills are needed as as well in order for them to be able to coordinate with group members and communicate ideas and products to clients or employeers.

Soft Skills required for Software Development include:

- Communication- Solid Communication skills are vital for software developers, especially those working in groups. Having good communication between members will allow a free and flowing exchange of ideas and suggestions which may help identify potential problems within software projects and even improve existing features. In addition, it will improve teamwork and coordination as group members will be more willing to communicate and participate as a team to work together for one goals.
- Attention for Detail Having a good attention for detail is important for software developers when working together to complete a software project. Software developers who have a good eye for details will continuously test and run their products for corner cases and edge cases in order to minimise the amount of bugs in the final product and enable it to work.
- Problem Solving skills Having a good foundation of problem solving skills is critical for those majoring in software development. A large majority of the software projects undertaken by software developers consist of coding and programming, requiring a lot of logic and solving the challenges and coding questions and being able to adapt to the clients changes.

3.4 Companies hiring graduates of major

There are numerous notable companies that hire graduates pursuing a career of Software Development. Some of the those companies include:

- Google is a multinational company that focuses on software development and creating hardware products, cloud services as well as maintaining its own search engine in the internet.[**3**]
- Amazon is a multinational company that specialises in e-commerce, cloud services, streaming services as well as cloud computing.[**7**]
- Apple is a multinational company that focuses on the development of software products, such as iOS, as well as development of cloud services.[**4**] While these companies may have different visions and goals. All of them share the same aim in maintaining and developing software and hardware products as well as cloud services to ensure that their software and hardware runs efficiently.

CHAPTER 4

Emerging Possibilities

4.1 Industry progression and potential problems of the future

- Virtual Reality consists of creating a 3D world utilising blueprints as well as computer generated 3d models, components of software architecture. The user will be able move around, see and interact with the 3d objects within the virtual world as well as utilise headsets to hear the surroundings" of the virtual world, by using a set of tech fitted goggles which fulfill this purpose. Examples of devices that utilise virtual reality would include Oculus rift and Playstation.[**2**] While it can be used for recreational purposes like game simulators such as The Climb and Saber, it can also be used for practical purposes as well. An example of this would be creating a virtual world of an architectural design idea. Instead of using speech to convey a description of the ideas which may be misinterpreted, your clients will be able to physically see and view the potential ideas that you have, enabling them to give you feedback about your design and allowing you to redesign it on the go.Such possibilities for future graduates include more career opportunities of Software Architecture like Software Architects or Software Architecture Management as they will have more prospects of creating types of virtual reality from the Software Architecture Designs[**11**].

FIGURE 4.1: Oculus Rift Device [**?**]

- Programming Assistants such as Kite and Jedi are one of the future possibilities within the job market of Software Development. Programming assistants consist of A.I used to help detect potential errors in the code of computer programs,create auto suggestions and syntax as well as function signatures that A.I predict the coders may program with. The use of programming assistants may help QA analysts the time taken to fix and debug code as it.Software developers will be required to plan,design, run and test programming assistants to ensure the code programmers make will be efficient. This opens new career opportunities as Software developers could create,supervise,design new programming assistants for other programming languages like Java[**1**].
- Functional Programming languages such as utilises mathematical functions to execute computation within computer programs. Thus, algorithms can be developed and designed to create expressions and pure functions(functions that do not change any global variables)[**6**] used to simplify long lines of code and execute the program smoothly without changing its states. Functional programming may arguably become a popular programming paradigm for aspiring and veteran software developers to utilize.This will provide future software developers will potential jobs within design and website development as functional programming enables the use of mathematical functions and expressions to create, design and run websites fluidly[**1**].

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