

# Computer Science 1

1015F ~ 1018F ~ 1016S

2008

## Notes to Students

### Course Description

Computer Science 1015/8F and 1016S together constitute a complete Computer Science curriculum for first year students, offering an introduction to the development of algorithms and writing of computer programs, along with other selected topics in Computer Science.

CSC1015F and CSC1018F are offered in the first semester – CSC1015F is for students who are new to programming or who are not adept at Java while CSC1018F is for students who have already mastered the Java programming language and wish to study an alternative language. A student may only register for and get credit for one of these 2 courses.

CSC1016S is offered in the second semester for all 1<sup>st</sup> year Computer Science students.

### Prerequisites

CSC1015F	CSC1018F	CSC1016S
At least a D in Mathematics at the Higher Grade in Matric.	At least a D in Mathematics at the Higher Grade in Matric, and Distinction (A) in Computer Science at the Higher Grade in Matric, and Pass a Java competency examination administered by the department, and Must be able to attend CS lectures in 4th period.	CSC1015F (or supp for CSC1015F), or CSC1010H, or registration for CSC1018F.

*Notes:*

No prior knowledge of computing or computer programming is necessary for CSC1015F.

Students enrolled in CSC1011H, who join the CSC1016S class in the second semester, must have completed CSC1010H and the first semester of CSC1011H.

The first year mathematics course MAM1000W (or its equivalent) is a co-requisite.

## Instruction

<b>Course Convenor:</b>	Dr Hussein Suleman	<a href="mailto:hussein@cs.uct.ac.za">hussein@cs.uct.ac.za</a>
<b>Lecturers:</b>	Prof. Sonia Berman (1015F)	<a href="mailto:sonia@cs.uct.ac.za">sonia@cs.uct.ac.za</a>
	Prof. Edwin Blake (1016S)	<a href="mailto:edwin@cs.uct.ac.za">edwin@cs.uct.ac.za</a>
	Dr James Gain (1018F)	<a href="mailto:jgain@cs.uct.ac.za">jgain@cs.uct.ac.za</a>
	Dr Michelle Kuttel (1018F/6S)	<a href="mailto:kuttel@cs.uct.ac.za">kuttel@cs.uct.ac.za</a>
	Dr Hanh Le (1015F/6S)	<a href="mailto:hanh@cs.uct.ac.za">hanh@cs.uct.ac.za</a>
	Dr Audrey Mbogho (1016S)	<a href="mailto:ambogho@cs.uct.ac.za">ambogho@cs.uct.ac.za</a>
	Dr Anet Potgieter (1015F)	<a href="mailto:anet@cs.uct.ac.za">anet@cs.uct.ac.za</a>
	Dr Hussein Suleman (1015F)	<a href="mailto:hussein@cs.uct.ac.za">hussein@cs.uct.ac.za</a>

### Teaching Assistants (TAs):

(will be announced on Vula)

### Tutors:

(will be announced on Vula)

## Location

CSC1015F lectures are held in Computer Science 2A in 4<sup>th</sup> period (11h00-11h45) and Computer Science 302 in 5<sup>th</sup> period (12h00-12h45), both in the Computer Science Building, from Monday-Thursday every week. You may attend either lecture.

CSC1018F lectures are held in Computer Science 302 on Mondays in 4<sup>th</sup> period (11h00-11h45) and in Mathematics 212 on Fridays in 4<sup>th</sup> period (11h00-11h45). There are only 2 lectures each week.

Theory tests will be held in Jameson Hall in the lecture periods.

Practical tests in CSC1015F and CSC1016S will be held in Scilab A and B on selected Fridays. More information on this will be provided in class.

Tutorials in CSC1015F and CSC1016S are held in Scilab A on Monday, Tuesday and Wednesday afternoons every week. You will be allocated to one 2-hour session, where a seat will be reserved for you. Tutorials in CSC1018F may be done in The Shuttleworth Lab (TSL) – no specific time will be allocated but you may use the 4<sup>th</sup> period on Tuesday-Thursday.

Pre-practical sessions are held every Friday (other than those when a Practical Test takes place in CSC1015F/CSC1016S) in the lecture venue. During these sessions, the TAs and/or lecturers will review essential work for upcoming practical assignments and tests. In CSC1018F these sessions will include mini-tests on current work.

## Textbook and Notes

The prescribed textbooks are as follows:

1015F	1016S	1018F
Absolute Java (International/Third edition) by <i>Walter Savitch</i> Pearson / Addison-Wesley ISBN: 9780321505040		Dive into Python 2004 Edition Mark Pilgrim <a href="http://diveintopython.org/">http://diveintopython.org/</a>

Class notes (copies of slides) may be available for selected sections and announced by the relevant lecturer(s).

Electronic copies of lecture slides will be made available on Vula.

## Vula

Vula (<http://vula.uct.ac.za>) is the university-wide online learning management system that gives you access to resources to assist in the learning process. The class website for all courses will be located on the Vula system.

There are various tools available for co-operative (such as the discussion forum) and self-paced (such as class notes) learning. Lecturers, TAs and tutors may be consulted through Vula – this is preferable since any questions that are answered may benefit other students as well.

Vula is used for the submission of ALL practical assignments and practical tests and for providing students with marks for assignments and tests, and feedback where appropriate.

Information will be added on a regular basis to the class website. All students will be expected to consult the website on a daily (Monday-Friday) basis for updates on assignments, marks, hints, deadlines, etc.

All discussion of a general nature will take place on the class website Discussion Board. At the discretion of the lecturer, course convenor or TA, responses to individual email messages may be posted on the public board if the responses are deemed relevant to all students.

Please refrain from posting anything of the following nature anywhere on the website, as it may violate the university's Appropriate Use of Computer Facilities policy (see ICTS website), necessitating disciplinary and/or legal proceedings:

- sexist, racist or otherwise discriminatory comments, flame wars
- segments of program code (other than something provided by the instructor)
- solutions to graded work (or part thereof) before the deadline for submission
- illegal material

## Course Assessment

Your final mark is dependent on a number of components that are assessed during the course and at the final examination. Assume variables are defined as follows:

- Practicals = Average of practical assignment marks as a percentage
- PTests = Average of practical test marks as a percentage (in CSC1015F and CSC1016S only)
- Tests = Average of theory test marks as a percentage
- MTests = Average of mini-test marks as a percentage (in CSC1018F only)
- Exam = Exam mark as a percentage

### ***DP Requirement***

Before a student may write any final examination, Duly Performed status must be obtained. This is an indicator that a student has performed the required work during the semester. A DP list is published prior to the examination and no student will be assessed in the final examination if DP status is not granted - not obtaining DP status is thus equivalent to failing a course.

A student is granted DP status in CSC1015F/CSC1016S if the following condition is met:

- $(4/5 * \text{Practicals} + 1/5 * \text{PTests}) \geq 45\%$

A student is granted DP status in CSC1018F if the following condition is met:

- $\text{Practicals} \geq 45\%$

### ***Examinations***

The examination timetable will be published sufficiently in advance of the final examination on university notice boards. It is the student's responsibility to take note of the correct time and place for the examinations.

All examinations will be closed-book and closed-notes (i.e., you may not bring your notes or textbooks into the examination room). There will be one cumulative 3-hour final examination in each course. More information will be provided prior to each of these.

### ***Theory Tests***

All class theory tests will be in-class, closed-book. There will be three 40 minute theory tests in each course. More information will be provided prior to each of these.

### ***Practical Tests***

All practical tests will be in Scilab A/B and will be closed-book. There will be two 40 minute practical tests in CSC1015F and two 40 minute practical tests in CSC1016S. More information will be provided prior to each of these.

### **Mini-Tests**

All mini-tests in CSC1018F will be in the lecture venue at the discretion of the lecturer.

### **Final Mark**

A final mark will be calculated as follows:

<b>CSC1015F</b>	<b>CSC1016S</b>	<b>CSC1018F</b>
Final = $0.20 * \text{Practicals} + 0.15 * \text{Tests} + 0.05 * \text{PTests} + 0.60 * \text{Exam}$		Final = $0.20 * \text{Practicals} + 0.15 * \text{Tests} + 0.05 * \text{MTests} + 0.60 * \text{Exam}$
In order to pass CSC1015F or CSC1016S, ALL of the following requirements MUST be met:		In order to pass CSC1018F, ALL of the following requirements MUST be met:
<ul style="list-style-type: none"><li>• Final <math>\geq 50\%</math></li><li>• <math>(4/5 * \text{Practicals} + 1/5 * \text{PTests}) \geq 45\%</math></li><li>• <math>(1/5 * \text{Tests} + 4/5 * \text{Exams}) \geq 45\%</math></li></ul>		<ul style="list-style-type: none"><li>• Final <math>\geq 50\%</math></li><li>• Practical <math>\geq 45\%</math></li><li>• <math>(3/16 * \text{Tests} + 3/4 * \text{Exams} + 1/16 * \text{MTests}) \geq 45\%</math></li></ul>

### **Grade Allocation**

<b>Score Range</b>	<b>Class of Pass</b>
75 – 100	1
70 – 74	2+
60 – 69	2-
50 – 59	3
0 – 49	F

### **Plagiarism**

Refer to attached document for the departmental plagiarism policy. This policy will be strictly enforced.

All assignments, tests and examinations are done individually – there is NO group work allowed in these courses. It is acceptable to discuss the questions for assignments with peers but not the solutions. When in doubt, speak to a tutor or TA.

Students are required to sign and submit a form (on the last page) verifying that they have read and understood the contents of this policy before commencing any form of assessed work.

## **Tutorial Sessions**

Each week there will be a tutorial session in the computer laboratories where you may discuss the current practical assignment and any general issues related to practical work with the tutors who are available. Attendance at these sessions is not compulsory, but strongly encouraged.

Students in the Science Faculty in CSC1015F will be allocated to a tutorial session in the first week of class. Other students must choose their own sections using the “Section Info” tool on the class website. It is your responsibility to choose an appropriate tutorial session timeously, i.e., one that fits in with your schedule. If you do not sign up for a session as soon as possible and find that all slots are filled, it is your responsibility to find a student with whom you can arrange a swap as soon as possible.

## **Practical Assignment Policies**

### ***Questions and Submission***

All questions for assignments, along with all related requisites, will be available on the class website on Vula.

Assignments may be done in your own time or during the allocated tutorial session, and must be submitted by the deadline indicated on Vula. No late submissions will be accepted unless a general extension has been granted. In very rare instances, exceptions may be made at the discretion of the course convenor on an individual basis, usually upon submission of a suitable medical certificate.

Queries about the assignment must be directed to the TA (in the case of automated marking) or tutor who has marked your work (in the case of tutor marking). General discussion about the question is permitted on Vula, but discussion about the solution is not allowed.

All practical assignments will be submitted electronically via Vula ONLY. The online submission system used to receive your assignments will provide the official timestamp used to determine whether a program is on time. Automatically-marked assignments will automatically deduct marks for late submissions.

### ***Marking***

All CSC1015F and CSC1016S assignments will be marked automatically based on test cases and the marks uploaded to Vula.

Tutors will mark randomly-chosen practical assignments in CSC1015F and CSC1016S and all assignments in CSC1018F during the semester. Marking is usually based on the following criteria:

1. Correctness of program.
2. Documentation, internal and external, as appropriate.
3. Efficient use of algorithms and appropriate data structures.
4. Stress - program must function correctly under all and/or extreme and unusual combinations of input.

## ***Equipment and Programming Language***

All programming for CSC1015F and CSC1016S will be done in Java (JDK v1.5.0) unless otherwise stated. The tutors will compile and test programs on JGrasp v1.8.4 running on Windows XP.

All programming for CSC1018F will be done in Python 2.5 unless otherwise stated. The tutors will compile and tests programs on Ubuntu Linux.

It is the responsibility of the student to submit a program that will successfully compile and execute on the specified platform. Any student who works on their own equipment must ensure that all assignments will compile and execute on the university equipment before submission – no discussion will be entered into after submission.

Computing facilities are available for use in the Scilabs that are located in the Computer Science building (Scilab A and B), RW James (Scilab C) and P D Hahn (Scilab D). These laboratories are open during the following hours:

Monday to Friday : 08h00 – 22h00

Saturday, Sunday : 08h00 – 14h00

Students may also use The Shuttleworth Lab, which is located in the Computer Science building and is open 24/7 (with student-card access). Students in CSC1018F need to use this facility.

It is ALWAYS the student's responsibility to ensure that adequate backup copies are made of all work in progress and all work already completed. Loss of data or programs is not an acceptable excuse for non-submission or late submission of assignments.

## **Information Dissemination and Communication**

### ***Attendance and Absence***

This is a lecture course. While attendance at lectures is not mandatory after the first day, all marked work (assignments, tests and exams) will be based on material covered in the lectures. Obviously, non-attendance at tests and exams will result in a mark of 0 (zero).

ALL students will be expected to complete ALL assigned work. If you miss ANY assigned work with a legitimate reason, send an email to the course convenor within a week or as soon as possible thereafter. Note that there are few legitimate reasons that will be accepted – these include hospitalization or serious illness – and a medical certificate from a qualified medical practitioner is typically required. Such medical certificates must be delivered to the departmental secretary.

### ***Queries***

Any queries about the content of the lectures MUST be directed to the lecturer teaching that section.

Any queries about marks or marking of practical assignments must be directed to your tutor or TA.

All marked work (whether in paper or electronic format) must be kept until the end of the semester. In general, queries about marks MUST be made within a week of marked work being returned. No queries about any marks will be entertained after the final examination.

Any queries about the administration of the course must be directed to the TA.

The course convenor must ONLY be contacted as a last resort unless otherwise indicated.

### **Disability**

If any student needs special accommodation because of a disability, please contact the course convenor during the first week of classes.

## **Computer Science Development Program**

The Computer Science Department runs academic development courses – CSC1010H and CSC1011H – that are part of the General Entry Program in Science (GEPS). CSC1010H runs over an entire year and covers the syllabus of CSC1015F at a somewhat slower pace and in greater depth. In the first semester of the following year of study, CSC1011H covers additional material to assist students in their transition to CSC1016S, which forms the second semester module of CSC1011H. Note that each of these GEPS courses counts only as a half credit.

Students who do not perform adequately in CSC1015F may be permitted to join CSC1010H at the beginning of the second quarter, on condition that the student has a good record of submitting practical assignments and there is sufficient space in the CSC1010H course. Any student who feels that they may benefit by joining CSC1010H should consult Hussein Suleman or Gary Stewart (GEPS Coordinator) before the end of the first quarter.

## **Syllabus**

Corresponding chapter numbers in the prescribed textbook are indicated in parentheses.

<b>CSC1015F</b>	<b>CSC1016S</b>	<b>CSC1018F</b>
<ul style="list-style-type: none"><li>● Introduction to Computer Science<ul style="list-style-type: none"><li>● What is Computer Science</li><li>● Applications of Computing</li><li>● History of Computing</li><li>● Computer Hardware (Machine Architecture, Networking)</li><li>● Computer Software (System Software, Applications)</li><li>● Algorithms and Programming Languages</li></ul></li><li>● Introduction to Java (Chapter 1)<ul style="list-style-type: none"><li>● The Java programming environment</li><li>● Hello World</li></ul></li><li>● Data Types (Chapter 1)<ul style="list-style-type: none"><li>● Numerical Data types</li></ul></li></ul>	<ul style="list-style-type: none"><li>● Recursion (Chapter 11)</li><li>● Exceptions (Chapter 9)<ul style="list-style-type: none"><li>● Using exceptions</li><li>● Types of exceptions</li><li>● Defining exceptions</li></ul></li><li>● File I/O (Chapter 10)<ul style="list-style-type: none"><li>● Text files</li><li>● Binary files</li></ul></li><li>● Polymorphism (Chapter 8)<ul style="list-style-type: none"><li>● Using polymorphism</li><li>● Abstract classes</li></ul></li><li>● UML and Patterns (Chapter 12)<ul style="list-style-type: none"><li>● Understanding UML</li></ul></li></ul>	<ul style="list-style-type: none"><li>● Introduction to Python<ul style="list-style-type: none"><li>● The Python programming environment</li><li>● Hello World</li></ul></li><li>● Data Types<ul style="list-style-type: none"><li>● Simple Data types</li><li>● Lists and Dictionaries</li><li>● Expressions</li><li>● Variables and Assignment</li></ul></li><li>● Testing</li><li>● Tracing and Debugging</li><li>● Comments</li><li>● Basic I/O</li></ul>

<ul style="list-style-type: none"> <li>● Strings</li> <li>● Expressions</li> <li>● Variables and Assignment</li> <li>● Testing</li> <li>● Tracing and Debugging</li> <li>● Comments</li> <li>● Console I/O (Chapter 2) <ul style="list-style-type: none"> <li>● Screen output</li> <li>● Console input</li> </ul> </li> <li>● Control Structures (Chapter 3) <ul style="list-style-type: none"> <li>● Boolean expressions and logical conditions</li> <li>● If statements, nested ifs, if-else, if ladders</li> <li>● Loops: for, while, do-while</li> </ul> </li> <li>● Classes (Chapter 4, 5) <ul style="list-style-type: none"> <li>● Defining classes</li> <li>● Using classes</li> <li>● Information hiding and encapsulation</li> <li>● Overloading</li> <li>● Constructors</li> <li>● Static methods and variables</li> <li>● References</li> <li>● Packages and Javadoc</li> </ul> </li> <li>● Arrays (Chapter 6) <ul style="list-style-type: none"> <li>● Defining and using 1-dimensional arrays</li> <li>● Arrays and References</li> <li>● Multidimensional arrays</li> </ul> </li> <li>● Inheritance (Chapter 7) <ul style="list-style-type: none"> <li>● Inheritance of classes</li> <li>● Inherited methods</li> </ul> </li> <li>● Number Systems <ul style="list-style-type: none"> <li>● Machine representations of data</li> <li>● Binary operations</li> <li>● Boolean algebra</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Introduction to Patterns</li> <li>● Interfaces (Chapter 13) <ul style="list-style-type: none"> <li>● Creating interfaces</li> <li>● Using interfaces</li> </ul> </li> <li>● Sorting and Searching (in multiple chapters) <ul style="list-style-type: none"> <li>● Selection Sort</li> <li>● Merge Sort</li> <li>● Quick Sort</li> <li>● Analysis of sorting algorithms</li> <li>● The Bisection algorithm</li> </ul> </li> <li>● Linked Data Structures (Chapter 15) <ul style="list-style-type: none"> <li>● Singly-linked lists</li> <li>● Doubly-linked lists</li> <li>● Stacks</li> <li>● Queues</li> <li>● Binary Trees</li> </ul> </li> <li>● GUIs and Graphics (Chapter 17, 18) <ul style="list-style-type: none"> <li>● Java Graphics primitives</li> <li>● Swing</li> </ul> </li> <li>● Ethics in Computing and ICT for Development <ul style="list-style-type: none"> <li>● Ethics</li> <li>● Professional Practice</li> <li>● Legalities of Software Systems</li> <li>● Open Source Software Development</li> <li>● ICT for Development</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Control Structures <ul style="list-style-type: none"> <li>● Boolean expressions and logical conditions</li> <li>● Selection statements</li> <li>● Loops</li> <li>● Functional constructs</li> </ul> </li> <li>● Classes <ul style="list-style-type: none"> <li>● Defining classes</li> <li>● Using classes</li> <li>● Information hiding and encapsulation</li> <li>● Overloading</li> <li>● Constructors</li> <li>● Inheritance</li> <li>● Static methods and variables</li> <li>● Modules</li> </ul> </li> <li>● Arrays <ul style="list-style-type: none"> <li>● Multidimensional arrays</li> </ul> </li> <li>● Number Systems <ul style="list-style-type: none"> <li>● Machine representations of data</li> <li>● Binary operations</li> <li>● Boolean algebra</li> </ul> </li> <li>● File I/O</li> <li>● Regular Expressions</li> </ul>
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## Tentative Schedule of Lectures and Practical Work

### CSC1015F

The numbers indicate the corresponding chapter of the prescribed textbook.

	M	T	W	H	F	Lec	Practical	Due Date
18 Feb	Intro	Intro	Intro	Intro	Orient	hs		
25 Feb	Intro	Intro	1	1	PP		0 - Intro	28 Feb
3 Mar	1	2	2	2	PP		1 - Intro	6 Mar
10 Mar	3	3	Test1	3	PP	hl	2 - Console IO	13 Mar
17 Mar	3	3	3	3	Holiday		3 - Control(if)	20 Mar
24 Mar	Holiday							
31 Mar	4	4	4	4	PTest1		4 - Control	3 Apr
7 Apr	4	4	5	5	PP	ap	5 - Classes	10 Apr
14 Apr	5	5	Test2	5	PP		6 - Classes	17 Apr
21 Apr	6	6	6	6	PP		7 - Classes	24 Apr
28 Apr	Holiday	6	7	Holiday	PTest2	sb		
5 May	7	7	7	7	PP		8 - Arrays	8 May
12 May	NS	NS	Test3	NS	PP		9 - Arrays	15 May
19 May	NS	NS	NS	Study			10- Inheritance	21 May
26 May	Study			Exams				
2 Jun	Exams							
9 Jun	Exams							
16 Jun	Holiday							

### CSC1016S

The numbers indicate the corresponding chapter of the prescribed textbook.

	M	T	W	H	F	Lec	Practical	Due Date
21 Jul	11	11	11	11	PP	mk		
28 Jul	9	9	9	9	PP		1 - Review	31 Jul
4 Aug	10	10	10	10	PP		2 - Recursion	7 Aug
11 Aug	8	8	Test1	8	PP	hl	3 - Exceptions	14 Aug
18 Aug	8	12	12	13	PTest1		4 - File IO	21 Aug
25 Aug	SS	SS	SS	SS	PP		5 - Polymorph	28 Aug
1 Sep	Holiday							
8 Sep	15	15	15	15	PP	am	6 – Sorting	11 Sep
15 Sep	15	17	Test2	17	PP		7 - LL	18 Sep
22 Sep	17	18	Holiday	18	PTest2			
29 Sep	18	Eth	Eth	Eth	PP	eb	8 - Stax/Oue	2 Oct
6 Oct	Eth	Eth	Test3	Eth	PP		9 - GUI	9 Oct
13 Oct	Eth	Eth	Eth	Eth	PP		10 - Ethics	16 Oct
20 Oct	Eth	Study						
27 Oct	Exams							
3 Nov	Exams							
10 Nov	Exams							

**CSC1018F**

	M	T	W	H	F	Lec	Practical	Due Date
18 Feb	Intro				Intro	ig		
25 Feb	Syntax				Syntax			
3 Mar	Control				Control		1 - CoreSyntax	6 Mar
10 Mar	OO		Test1		OO		2 - Control	13 Mar
17 Mar	Lists				Holiday		3 - OO	20 Mar
24 Mar	Holiday							
31 Mar	Adv				Adv		4 - Lists	3 Apr
7 Apr	Proi				Proi	mk	5 - AdvTopics	10 Apr
14 Apr	Testing		Test2		Proi		6 - Project1	17 Apr
21 Apr	Files				Proi		7 - Project2	24 Apr
28 Apr	Holiday			Holiday	Proi		8 - Project3	2 May
5 May	RE				RE		9 - Project4	8 May
12 May	NS		Test3		NS		10- RegExp	15 May
19 May	NS			Study				
26 May	Study			Exams				
2 Jun	Exams							
9 Jun	Exams							
16 Jun	Holiday							

# **Computer Science 1015F/1018F/1016S**

**2008**

## **Plagiarism Policy Acceptance**

I, \_\_\_\_\_, Student  
number: \_\_\_\_\_, hereby acknowledge that I have read and understood the  
plagiarism policy of the Department of Computer Science. I will adhere to this policy and the  
general policies of the university referred to therein.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_