NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering

BRC Bachelor of Engineering (Computer Science) Curriculum
Applicable to students matriculated in 2019 or later

Polytechnic Exemptions

27 AUs of exemptions and they are:

a. Technical Elective 1 (Major Prescribed elective, to be taken from CZ4xxx courses) - 3 AUs
b. Technical Elective 2 (Major Prescribed elective, to be taken from CZ4xxx courses) – 3 AUs
c. GER PE (BM, LA) - 6 AUs
d. Unrestricted electives - 15 AUs

e. Additional 3 AUs in Technical Elective 3 (Major Prescribed elective, to be taken from CZ4xxx courses) or other relevant courses on a case-by-case basis subject to the students having participated and done well in NTU research or other projects, or with additional Certificate in Mathematics from Diploma-Plus programmes, or having taken and done well in university level courses.

f. CZ1003 Introduction to Computational Thinking (Core)*#– 3 AUs

* For students who pass the qualification test. More details on this test will be disseminated to eligible students via their NTU email after matriculation.

#Not applicable to all diplomas. Some examples are:
- Diploma in Aerospace Engineering from Temasek Polytechnic
- Diploma in Aerospace Electronics from Temasek Polytechnic
- Diploma in Engineering with Business from Singapore Polytechnic

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering

3-year BEng (CS) Programme with Professional Internship (PI)
for Exempted Polytechnic Students
Applicable to students matriculated in 2019 or later

Overview of AUs requirement

Option I: 3-year Programme including Professional Internship

Note: Students will need to heavily overload to complete the programme within 3 years.

Year of Study		Core	Major Prescribed Elective (MPE)	General Education Requirement (GER)				Unrestricted Elective (UE)	Total
				Core	Prescribed Elective (PE)				
					BM	LA	STS		
Exemptions			6		3	3		15	27
1	Sem 1	14		3			3		20
	Sem 2	15		6					21
2	Sem 1	21		1					22
	Sem 2	10							10
3	Sem 1	10	6	3					19
	Sem 2	14	6	1					21
Total		**84**	**18**	14	3	3	3	15	140
				23					

Option II: 3.5-year Programme including Professional Internship

Year of Study		Core	Major Prescribed Elective (MPE)	General Education Requirement (GER)				Unrestricted Elective (UE)	Total
				Core	Prescribed Elective (PE)				
					BM	LA	STS		
Exemptions			6		3	3		15	27
1	Sem 1	11		3			3		17
	Sem 2	15		6					21
2	Sem 1	18		1					19
	Sem 2	15		1					16
3	Sem 1	10							10
	Sem 2	4	6	3					13
4	Sem 1	11	6						17
Total		**84**	**18**	14	3	3	3	15	140
				23					

Suggested Curriculum for Option I (3-year Programme including Professional Internship)

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec / TEL*	Tut	Lab/ Example class+	Total		
EXEMPTIONS							
CZ4xxx Technical Elective	MPE	2	1	1	4	3	
CZ4xxx Technical Elective	MPE	2	1	1	4	3	
Business & Management	GER PE - BM	2	1	-	3	3	Business & Management
Liberal Arts	GER PE - LA	2	1	-	3	3	Liberal Arts
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
TOTAL		**18**	**9**	**2**	**29**	**27**	

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec / TEL*	Tut	Lab/ Example class+	Total		
YEAR 1 SEMESTER 1							
MH1812 Discrete Mathematics	Core	2	1	1+	4	3	-
CZ1005 Digital Logic	Core	2	1	1	4	3	-
CZ1006 Computer Organisation and Architecture	Core	2	1	1	4	3	CZ1005 (can be taken concurrently)
CZ1013 Physics for Computing	Core	2	0	2	3	2	-
Science & Technology	GER PE - STS	2	1	1	4	3	
HW0188^ Engineering Communication I	GER core	-	2	-	2	2	HW0001 (can be taken concurrently)
GC0001 Sustainability: Seeing Through The Haze	GER core					1	online course
HW0001 Introduction to Academic Communication	GER core					0	

TOTAL		**10+2***	**6**	**5+3+**	**25**	**20**	
CZ1003 Introduction to Computational Thinking##	Core	2*	0	2+	4	3	Student who take this course cannot take CZ1007 concurrently.
YEAR 1 SEMESTER 2							
CZ1007 Data Structures	Core	2	1	1	4	3	CZ1003
CZ1011 Engineering Mathematics I	Core	2	1	1+	4	3	-
CZ1012 Engineering Mathematics II	Core	2	1	1+	4	3	CZ1011 (can be taken concurrently)
CZ2002 Object Oriented Design & Programming**	Core	2	1	1	4	3	CZ1007
CZ3001 Advanced Computer Architecture	Core	2	1	1	4	3	CZ1006
CZ0001 Engineers and Society#	GER core	2	1	-	3	3	-
CZ1015 Introduction to Data Science and Artificial Intelligence	GER core	2*	0	2	4	3	CZ1003
TOTAL		**12+2***	**6**	**5+2+**	**27**	**21**	

^ Should there be insufficient vacancies, students will take Eng Comm I & II in the following semester.

Available only in semester 2. Should there be insufficient vacancies, students will take Engrs and Society in the next semester 2.

** For students who have completed CZ1007 in Semester 1. Students who have yet to complete CZ1007 will take CZ2002 in Year 2 Semester 1 instead.

##Applicable to students who a. Did not opt for OR pass the qualification test and b. Admitted with non-exempted Diplomas. E.g. Diploma in Aerospace Engineering & Diploma in Aerospace Electronics from Temasek Polytechnic, Diploma in Engineering with Business from Singapore Polytechnic.

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec / TEL*	Tut	Lab/ Example class+	Total		
YEAR 2 SEMESTER 1							
CZ2001 Algorithms	Core	2	1	1+	4	3	MH1812, CZ1012 CZ1007
CZ2004 Human Computer Interaction	Core	2	1	1	4	3	-
CZ2005 Operating Systems	Core	2	1	1	4	3	CZ1006, CZ1007
CZ2006 Software Engineering	Core	2	1	1	4	3	CZ2002 (can be taken concurrently)
CZ2007 Introduction to Databases	Core	2	1	1	4	3	CZ2001 (can be taken concurrently)

Course Code and Title	Type	Lec	Tut	Lab	Total	AU	Pre-requisite / Remarks
CZ3003 Software Systems Analysis and Design	Core	2	1	1	4	3	CZ2006 (can be taken concurrently)
CZ3006 Net Centric Computing / Computer Networks	Core	2	1	1	4	3	CZ1006, CZ2002
ML0003 Kickstart your Career Success	GER core					1	online course
TOTAL		**14**	**7**	**6+1+**	**28**	**22**	

YEAR 2 SEMESTER 2							
CZ3179 Professional Internship	Core	-	-	-	-	10	ML0003, Year 3 standing
TOTAL		**-**	**-**	**-**	**-**	**10**	

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec	Tut	Lab	Total		
YEAR 3 SEMESTER 1							
CZ4079 Final Year Project	Core	-	-	-	-	-	Final year standing
CZ2003 Computer Graphics and Visualisation	Core	2	1	1	4	3	CZ1011
CZ3002 Advanced Software Engineering	Core	2	1	1	4	3	CZ2006
CZ3004 Multidisciplinary Design Project	Core	1	-	3	4	4	Year 3 standing
CZ4xxx Technical Elective 1	MPE	2	1	1	4	3	
CZ4xxx Technical Elective 2	MPE	2	1	1	4	3	
HW0288^ Engineering Communication II	GER core	-	2	-	2	2	HW0188, Year 3 standing
HY0001 Ethics & Moral Reasoning	GER core					1	online course
TOTAL		**9**	**6**	**7**	**22**	**19**	

YEAR 3 SEMESTER 2							
CZ4079 Final Year Project	Core	-	-	-	-	8	
CZ3005 Artificial Intelligence	Core	2	1	1	4	3	CZ1003, CZ2001
CZ3007 Compiler Techniques	Core	2	1	1	4	3	CZ2001, CZ2006
CZ4xxx Technical Elective 3	MPE	2	1	1	4	3	
CZ4xxx Technical Elective 4	MPE	2	1	1	4	3	
ET0001 Enterprise & Innovation	GER core					1	online course

TOTAL		8	4	4	16	21	

GRAND TOTAL (Years 1 to 3)	**140**

+Instead of normal tutorial/laboratory classes, Faculty can use Example Class for their pedagogical needs such as group discussion team based learning (TBL), seminar to review and reinforce concepts, provide additional coaching, give more worked examples, allow students to do practice exercises or do research or work on the computers etc.

3.5-year BEng (CS) Programme with Professional Internship (PI)
for Exempted Polytechnic Students
Applicable to students matriculated in 2019 or later

Suggested Curriculum for Option II (3.5-year Programme including Professional Internship)

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec / TEL*	Tut	Lab/ Example class+	Total		
EXEMPTIONS							
CZ4xxx Technical Elective	MPE	2	1	1	4	3	
CZ4xxx Technical Elective	MPE	2	1	1	4	3	
General elective	GER elective	2	1	-	3	3	Business & Management
General elective	GER elective	2	1	-	3	3	Liberal Arts
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
Unrestricted elective	Unrestricted elective	2	1	-	3	3	
TOTAL		**18**	**9**	**2**	**29**	**27**	

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec / TEL*	Tut	Lab/ Example class[+]	Total		
YEAR 1 SEMESTER 1							
MH1812 Discrete Mathematics	Core	2	1	1[+]	4	3	-
CZ1005 Digital Logic	Core	2	1	1	4	3	-
CZ1013 Physics for Computing	Core	2	0	2	3	2	-
HW0188^ Engineering Communication I	GER core	-	2	-	2	2	HW0001 (can be taken concurrently)
Science & Technology	GER PE - STS	2	1	1	4	3	
GC0001 Sustainability: Seeing Through The Haze	GER core					1	online course
HW0001 Introduction to Academic Communication	GER core					0	
TOTAL		**8+2***	**5**	**4+3[+]**	**21**	**17**	
CZ1003 Introduction to Computational Thinking[##]	Core	2*	0	2[+]	4	3	Student who take this course cannot take CZ1007 concurrently.
YEAR 1 SEMESTER 2							
CZ1006 Computer Organisation and Architecture	Core	2	1	1	4	3	CZ1005 (can be taken concurrently)
CZ1007 Data Structures	Core	2	1	1	4	3	CZ1003
CZ1011 Engineering Mathematics I	Core	2	1	1[+]	4	3	-
CZ1012 Engineering Mathematics II	Core	2	1	1[+]	4	3	CZ1011 (can be taken concurrently)
CZ2002 Object Oriented Design & Programming**	Core	2	1	1	4	3	CZ1007
CZ0001 Engineers and Society[#]	GER core	2	1	-	3	3	-
CZ1015 Introduction to Data Science and Artificial Intelligence	GER core	2*	0	2	4	3	CZ1003
TOTAL		**12+2***	**6**	**5+2[+]**	**27**	**21**	

^ Should there be insufficient vacancies, students will take Eng Comm I & II in the following semester.

[#] Available only in semester 2. Should there be insufficient vacancies, students will take Engrs and Society in the next semester 2.

** For students who have completed CZ1007 in Semester 1. Students who have yet to complete CZ1007 will take CZ2002 in Year 2 Semester 1 instead.

[##]Applicable to students who a. Did not opt for OR pass the qualification test and b. Admitted with non-exempted Diplomas. E.g. Diploma in Aerospace Engineering & Diploma in Aerospace Electronics from Temasek Polytechnic, Diploma in Engineering with Business from Singapore Polytechnic.

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec	Tut	Lab/ Example class[+]	Total		
YEAR 2 SEMESTER 1							
CZ2001 Algorithms	Core	2	1	1[+]	4	3	CZ1007, CZ1012, MH1812
CZ2004 Human Computer Interaction	Core	2	1	1	4	3	-
CZ2005 Operating Systems	Core	2	1	1	4	3	CZ1006, CZ1007
CZ2006 Software Engineering	Core	2	1	1	4	3	CZ2002 (can be taken concurrently)
CZ2007 Introduction to Databases	Core	2	1	1	4	3	CZ2001 (can be taken concurrently)
CZ3006 Net Centric Computing	Core	2	1	1	4	3	CZ1006, CZ2002
ML0003 Professional Development Course	GER core					1	online course
TOTAL		**12**	**6**	**5+1[+]**	**24**	**19**	
YEAR 2 SEMESTER 2							
CZ2003 Computer Graphics and Visualisation	Core	2	1	1	4	3	CZ1011
CZ3001 Advanced Computer Architecture	Core	2	1	1[+]	4	3	CZ1006
CZ3002 Advanced Software Engineering	Core	2	1	1	4	3	CZ2006
CZ3003 Software Systems Analysis and Design	Core	2	1	1	4	3	CZ2006 (can be taken concurrently)
CZ3005 Artificial Intelligence	Core	2	1	1	4	3	CZ1003, CZ2001
HY0001 Ethics & Moral Reasoning	GER core					1	online course
TOTAL		**10**	**5**	**4+1[+]**	**20**	**16**	

Course Code and Title	Type (i.e. Core/ MPE/ GER core/ GER PE/ Unrestricted elective)	No of Hours Per Week				AU	Pre-requisite / Remarks
		Lec	Tut	Lab	Total		
YEAR 3 SEMESTER 1							
CZ3179 Professional Internship	Core	-	-	-	-	10	ML0003, Year 3 standing
TOTAL		**-**	**-**	**-**	**-**	**10**	
YEAR 3 SEMESTER 2							
CZ4079 Final Year Project	Core	-	-	-	-	-	Final Year standing
CZ3004 Multidisciplinary Design Project	Core	1	-	3	4	4	Year 3 standing
CZ4xxx Technical Elective 1	MPE	2	1	1	4	3	
CZ4xxx Technical Elective 2	MPE	2	1	1	4	3	
HW0288 Engineering Communication II	GER core	-	2	-	2	2	HW0188, Year 3 standing
ET0001 Enterprise & Innovation	GER core					1	online course
TOTAL		**5**	**4**	**5**	**14**	**13**	
YEAR 4 SEMESTER 1							
CZ4079 Final Year Project	Core	-	-	-	-	8	
CZ3007 Compiler Techniques	Core	2	1	1	4	3	CZ2001, CZ2006
CZ4xxx Technical Elective 3	MPE	2	1	1	4	3	
CZ4xxx Technical Elective 4	MPE	2	1	1	4	3	
TOTAL		**6**	**3**	**3**	**12**	**17**	
GRAND TOTAL (Years 1 to 3.5)						**140**	

[+] An additional 10 hours per semester have been allocated for these non-lab based courses for Example Classes. Faculty can use these time slots for their pedagogical needs such as to reinforce concepts, provide additional coaching, give more worked examples, allow students to do practice exercises or do research or work on the computers etc.