NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering

Double Degree Programme in Computer Science and Economics Curriculum Structure

Applicable to students matriculating in 2018 or later

The BEng (CS) and BArts (Econs) is a 5-year double degree programme hosted by School of Computer Science and Engineering and the Economics Division of the School of Social Sciences (SSS). Students under this programme can opt to take the 10-week Professional Attachment.

Polytechnic students will be exempted a total of 9 AUs in the following courses:

a. Technical Elective 1 (Core elective, to be taken from CE2xxx or CE3xxx courses) - 3 AUs
b. Technical Elective 2 (Core elective, to be taken from CE4xxx or CZ4xxx) – 3 AUs
c. CZ1003 Introduction to Computational Thinking (Core) - 3 AUs

Overview of AUs requirement

Option I: 10-week Professional Attachment (PA)

Year of Study	Core (CS)	Core (ECON)	Major Prescribed Elective (MPE) (CS)	Major Prescribed Elective (MPE) (ECON)	General Education Requirement (GER)	Unrestricted Elective (UE)	Total
					Core		
1	11	6			1		18
	12	6			3		21
2	12	3			3		18
	12	6					18
3	12			3	2	3	20
	12		3	3	5		23
4		4	6	3			13
	8		6	3		2	19
5			3	12			15
				15			15
Total	79	25	18	39	14	5	180

Option II: 20-week Professional Internship (PI)

Year of Study	Core (CS)	Core (ECON)	Major Prescribed Elective (MPE) (CS)	Major Prescribed Elective (MPE) (ECON)	General Education Requirement (GER)	Total
					Core	
1	14	6			1	21
	12	6			3	21
2	12	3			3	18
	12	6			3	21
3	10			6	1	17
	3		3	12	2	20
4	3	4	6	3	1	17
	10					10
5			3	10		13
	8		6	8		22
Total	84	25	18	39	14	180

Option 1: 10-week Professional Attachment (PA)

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							
CZ1011 Engineering Mathematics I	Core (CS)	2	1	1+	4	3	-
CZ1012 Engineering Mathematics II	Core (CS)	2	1	1+	4	3	CZ1011 (can be taken concurrently)
CZ1003 Introduction to Computational Thinking[x]	Core (CS)	2*	0	2+	4	3	-
CZ1013 Physics for Computing	Core (CS)	2	0	2	3	2	-
HE1001 Microeconomic Principles	Core (Econ)	2	1	-	3	3	-
HE1002 Macroeconomic Principles	Core (Econ)	2	1	-	3	3	
GC0001 Sustainability: Seeing Through The Haze	GER core					1	online course
TOTAL		**10+2***	**4**	**2+4+**	**21**	**18**	
YEAR 1 SEMESTER 2							
CZ1005 Digital Logic	Core (CS)	2	1	1	4	3	
CZ1006 Computer Organisation and Architecture	Core (CS)	2	1	1	4	3	CZ1005 (can be taken concurrently)
CZ1007 Data Structures	Core (CS)	2	1	1	4	3	CZ1003
MH1812 Discrete Mathematics	Core (CS)	2	1	1+	4	3	-
HE1005 Intro to Probability & Statistical Inference	Core (Econ)	2	1	-	4	3	
HE2001 Intermediate Microeconomics	Core (Econ)	2	1	-	3	3	HE1001
CZ1015 Introduction to Data Science and Artificial Intelligence	GER core	2*	0	2	4	3	
TOTAL		**12+2***	**6**	**5+1+**	**27**	**21**	

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 (CS)	2	1	1^{+}	3	3	CZ1007, CZ1012, MH1812
CZ2002 Object Oriented Design & Programming	Core (CS)	2	1	1	4	3	CZ1007
CZ2004 Human Computer Interaction	Core (CS)	2	1	1	4	3	-
CZ2007 Introduction to Databases	Core (CS)	2	1	1	4	3	CZ2001 (can be taken concurrently)
HW0188^ Engineering Communication I	GER core	-	2	-	2	2	HW0001
HE2005 Principles of Econometrics	Core (Econ)	2	1	-	4	3	HE1005
HY0001 Ethics & Moral Reasoning	GER core					1	online course
TOTAL		**10**	**7**	**3+1^{+}**	**21**	**18**	
YEAR 2 SEMESTER 2							
CZ2003 Computer Graphics and Visualisation	Core (CS)	2	1	1	4	3	CZ1011
CZ2005 Operating Systems	Core (CS)	2	1	1	4	3	CZ1006, CZ1007
CZ2006 Software Engineering	Core (CS)	2	1	1	4	3	CZ2002 (can be taken concurrently)
CZ3001 Advanced Computer Architecture	Core (CS)	2	1	1	4	3	CZ1006
HE2002 Intermediate Macroeconomics	Core (Econ)	2	1	-	3	3	HE1002
HE3021 Intermediate Econometrics	Core (Econ)	2	1	-	3	3	HE2005 or at least an A grade in HE2004
TOTAL		**12**	**6**	**4**	**22**	**18**	

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

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							
CZ3002 Advanced Software Engineering	Core (CS)	2	1	1	4	3	CZ2006
CZ3003 Software Systems Analysis and Design	Core (CS)	2	1	1	4	3	CZ2006 (can be taken concurrently)
CZ3005 Artificial Intelligence	Core (CS)	2	1	1	4	3	CZ1003, CZ2001
CZ3007 Compiler Techniques	Core (CS)	2	1	1	4	3	CZ2001, CZ2006
Unrestricted Elective	Unrestricted elective	2	1	-	3	3	
Econs PE 1	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
ET0001 Enterprise & Innovation	GER core					1	online course
ML0003 Professional Development Course	GER core					1	online course
TOTAL		**12**	**6**	**4**	**22**	**20**	
YEAR 3 SEMESTER 2							
CZ3004 Multidisciplinary Design Project	Core (CS)	1	-	3	4	4	Year 3 standing
CZ3006 Net Centric Computing	Core (CS)	2	1	1	4	3	CZ1006, CZ2002
CZ0001 Engineers and Society[#]	GER core	2	1	-	3	3	
Technical Elective 1[x] (CE200x or CE300x)	MPE (CS)	2	1	1	4	3	
HW0288^ Engineering Communication II	GER core	-	2	-	2	2	HW0188
Econs PE 2	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
CZ3126 Professional Attachment (Special Semester)	Core (CS)	-	-	-	-	5	
TOTAL		**9**	**6**	**5**	**20**	**23**	

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

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 4 SEMESTER 1							
CZ4079 Final Year Project	Core (CS)	-	-	-	-	-	Final year standing
CZ4xxx Technical Elective 2[x]	MPE (CS)	2	1	1	4	3	
CZ4xxx Technical Elective 3	MPE (CS)	2	1	1	4	3	
HE4010 Singapore Economy in a Globalised World	Core (Econ)	2	2	-	4	4	HE2001, HE2002
Econs PE 3	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
TOTAL		**8**	**5**	**2**	**15**	**13**	
YEAR 4 SEMESTER 2							
CZ4079 Final Year Project	Core (CS)	-	-	-	-	8	
CZ4xxx Technical Elective 4	MPE (CS)	2	1	1	4	3	
CZ4xxx Technical Elective 5	MPE (CS)	2	1	1	4	3	
Econs PE 4	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Unrestricted Elective	Unrestricted elective	1	-	-	1	2	
TOTAL		**7**	**3**	**2**	**12**	**19**	
YEAR 5 SEMESTER 1							
CZ4xxx Technical Elective 6	MPE (CS)	2	1	1	4	3	
Econs PE 5	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 6	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 7	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 8	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
TOTAL		**10**	**5**	**1**	**16**	**15**	

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 5 SEMESTER 2							
Econs PE 9	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 10	MPE (Econ)	2	2	-	4	4	HE1005, HE2005
Econs PE 11	MPE (Econ)	2	2	-	4	4	HE1005, HE2005
Econs PE 12	MPE (Econ)	2	2	-	4	4	HE1005, HE2005
TOTAL		**8**	**7**	**-**	**15**	**15**	
GRAND TOTAL (Years 1 to 5)							**180**

[x] Exempted AUs for Polytechnic students with relevant diplomas

[+]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.

List of Courses which contribute to BEng (CS) degree

List of courses that contribute towards BEng (Computer Science)				AU Load	
Discipline Requirement	**Core**	MH1812	Discrete Mathematics	3	79 AUs (PA)
		CZ1011	Engineering Mathematics I	3	
		CZ1012	Engineering Mathematics II	3	
		CZ1003	Introduction to Computational Thinking	3	
		CZ1005	Digital Logic	3	
		CZ1006	Computer Organisation and Architecture	3	
		CZ1007	Data Structures	3	
		CZ1013	Physics for Computing	2	
		CZ2001	Algorithms	3	
		CZ2002	Object Oriented Design & Programming	3	
		CZ2003	Computer Graphics and Visualisation	3	
		CZ2004	Human Computer Interaction	3	
		CZ2005	Operating Systems	3	
		CZ2006	Software Engineering	3	
		CZ2007	Database Systems	3	
		CZ3001	Advanced Computer Architecture	3	
		CZ3002	Advanced Software Engineering	3	
		CZ3003	Software Systems Analysis and Design	3	
		CZ3005	Artificial Intelligence	3	
		CZ3006	Net Centric Computing	3	
		CZ3007	Compiler Techniques	3	
		CZ3004	Multidisciplinary Design Project	4	
		CZ3126	Professional Attachment	5	
		CZ4079	Final Year Project	8	
	Core Elective	CZ4xxx	CZ Technical Elective 1	3	18 AUs
		CZ4xxx	CZ Technical Elective 2	3	
		CZ4xxx	CZ Technical Elective 3	3	
		CZ4xxx	CZ Technical Elective 4	3	
		CZ4xxx	CZ Technical Elective 5	3	
		CZ4xxx	CZ Technical Elective 6	3	
General Education Requirements (GER)	**GER (Core)**	HW0188	Engineering Communication I	2	14 AUs
		HW0288	Engineering Communication II	2	
		ML0003	Professional Development Course	1	
		CZ0001	Engineers and Society	3	
		GC0001	Introduction to Sustainability: Multidisciplinary Approaches and Solutions	1	
		HY0001	Ethics and Moral Reasoning	1	
		ET0001	Enterprise and Innovation	1	

		CZ1015	Introduction to Data Science and Artificial Intelligence	3	
	GER(BM) **GER(LA)** **GER(STS)** **GER**	HE1001 HE1002 HE1005 HE2005	Microeconomic Principles Macroeconomic Principles Introduction to Probability & Statistical Inference Principle of Econometrics*	3 3 3 3	12 AUs
	UE		UE Any of HE2001, HE2002, HE2005, HE4010, Econs Major PEs	5 12	17 AUs
			TOTAL	**140 AUs**	

Option 2: 20-week Professional Internship (PI)

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							
CZ1011 Engineering Mathematics I	Core (CS)	2	1	1^{+}	4	3	-
CZ1012 Engineering Mathematics II	Core (CS)	2	1	1^{+}	4	3	CZ1011 (can be taken concurrently)
CZ1003 Introduction to Computational Thinking^{x}	Core (CS)	2*	0	2^{+}	4	3	-
CZ1005 Digital Logic	Core (CS)	2	1	1	4	3	
CZ1013 Physics for Computing	Core (CS)	2	0	2	3	2	-
HE1001 Microeconomic Principles	Core (Econ)	2	1	-	3	3	-
HE1002 Macroeconomic Principles	Core (Econ)	2	1	-	3	3	
GC0001 Sustainability: Seeing Through The Haze	GER core					1	online course
TOTAL		**12+2***	**5**	**3+4^{+}**	**25**	**21**	
YEAR 1 SEMESTER 2							
MH1812 Discrete Mathematics	Core (CS)	2	1	1^{+}	4	3	-
CZ1006 Computer Organisation and Architecture	Core (CS)	2	1	1	4	3	CZ1005 (can be taken concurrently)
CZ1007 Data Structures	Core (CS)	2	1	1	4	3	CZ1003
CZ2004 Human Computer Interaction	Core (CS)	2	1	1	4	3	-
HE1005 Intro to Probability & Statistical Inference	Core (Econ)	2	1	-	4	3	
HE2001 Intermediate Microeconomics	Core (Econ)	2	1	-	3	3	HE1001
CZ1015 Introduction to Data Science and Artificial Intelligence	GER core	2*	0	2	4	3	
TOTAL		**12+2***	**6**	**5+1^{+}**	**27**	**21**	

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 (CS)	2	1	1[+]	3	3	CZ1007, CZ1012, MH1812
CZ2002 Object Oriented Design & Programming	Core (CS)	2	1	1	4	3	CZ1007
CZ2005 Operating Systems	Core (CS)	2	1	1	4	3	CZ1006, CZ1007
CZ2007 Introduction to Databases	Core (CS)	2	1	1	4	3	CZ2001 (can be taken concurrently)
HW0188^ Engineering Communication I	GER core	-	2	-	2	2	HW0001
HE2005 Principles of Econometrics	Core (Econ)	2	1	-	4	3	HE1005
HY0001 Ethics & Moral Reasoning	GER core					1	online course
TOTAL		**10**	**7**	**3+1[+]**	**21**	**18**	
YEAR 2 SEMESTER 2							
CZ2003 Computer Graphics and Visualisation	Core (CS)	2	1	1	4	3	CZ1011
CZ2006 Software Engineering	Core (CS)	2	1	1	4	3	CZ2002 (can be taken concurrently)
CZ3003 Software Systems Analysis and Design	Core (CS)	2	1	1	4	3	CZ2006 (can be taken concurrently)
CZ3006 Net Centric Computing	Core (CS)	2	1	1	4	3	CZ1006, CZ2002
CZ0001 Engineers and Society[#]	GER core	2	1	-	3	3	
HE2002 Intermediate Macroeconomics	Core (Econ)	2	1	-	3	3	HE1002
HE3021 Intermediate Econometrics	Core (Econ)	2	1	-	3	3	HE2005 or at least an A grade in HE2004
TOTAL		**14**	**7**	**4**	**25**	**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.

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							
CZ3001 Advanced Computer Architecture	Core (CS)	2	1	1^{+}	4	3	CZ1006
CZ3002 Advanced Software Engineering	Core (CS)	2	1	1	4	3	CZ2006
CZ3004 Multidisciplinary Design Project	Core (CS)	1	-	3	4	4	Year 3 standing
Econs PE 1	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 2	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
ET0001 Enterprise & Innovation	GER core					1	online course
TOTAL		**9**	**4**	**4+1^{+}**	**18**	**17**	
YEAR 3 SEMESTER 2							
CZ3005 Artificial Intelligence	Core (CS)	2	1	1	4	3	CZ1003, CZ2001
Technical Elective 1^{x} (CE200x or CE300x)	MPE (CS)	2	1	1	4	3	
HW0288^ Engineering Communication II	GER core	-	2	-	2	2	HW0188
Econs PE 3	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 4	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 5	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 6	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
TOTAL		**12**	**8**	**2**	**22**	**20**	
YEAR 4 SEMESTER 1							
CZ3007 Compiler Techniques	Core (CS)	2	1	1	4	3	CZ2001, CZ2006
CZ4xxx Technical Elective 2^{x}	MPE (CS)	2	1	1	4	3	
CZ4xxx Technical Elective 3	MPE (CS)	2	1	1	4	3	
HE4010 Singapore Economy in a Globalised World	Core (Econ)	2	2	-	4	4	HE2001, HE2002
Econs PE 7	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
ML0003 Professional Development Course	GER core					1	online course
TOTAL		**10**	**6**	**3**	**19**	**17**	
YEAR 4 SEMESTER 2							
CZ3179 Professional Internship	Core (CS)	-	-	-	-	10	
TOTAL		**-**	**-**	**-**	**-**	**10**	

YEAR 5 SEMESTER 1							
CZ4079 Final Year Project	Core (CS)	-	-	-	-	-	Final year standing
CZ4xxx Technical Elective 4	MPE (CS)	2	1	1	4	3	
Econs PE 8	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 9	MPE (Econ)	2	1	-	3	3	HE1005, HE2005
Econs PE 10	MPE (Econ)	2	2	-	4	4	HE1005, HE2005
TOTAL		**8**	**5**	**1**	**14**	**13**	
YEAR 5 SEMESTER 2							
CZ4079 Final Year Project	Core (CS)	-	-	-	-	8	
CZ4xxx Technical Elective 5	MPE (CS)	2	1	1	4	3	
CZ4xxx Technical Elective 6	MPE (CS)	2	1	1	4	3	
Econs PE 11	MPE (Econ)	2	2	-	4	4	HE1005, HE2005
Econs PE 12	MPE (Econ)	2	2	-	4	4	HE1005, HE2005
TOTAL		**8**	**6**	**2**	**16**	**22**	
GRAND TOTAL (Years 1 to 5)							**180**

[x] Exempted AUs for Polytechnic students with relevant diplomas

[+]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.

List of Courses which contribute to BEng (CS) degree

List of courses that contribute towards BEng (Computer Science)				AU Load	
Discipline Requirement	**Core**	MH1812	Discrete Mathematics	3	84 AUs
		CZ1011	Engineering Mathematics I	3	
		CZ1012	Engineering Mathematics II	3	
		CZ1003	Introduction to Computational Thinking	3	
		CZ1005	Digital Logic	3	
		CZ1006	Computer Organisation and Architecture	3	
		CZ1007	Data Structures	3	
		CZ1013	Physics for Computing	2	
		CZ2001	Algorithms	3	
		CZ2002	Object Oriented Design & Programming	3	
		CZ2003	Computer Graphics and Visualisation	3	
		CZ2004	Human Computer Interaction	3	
		CZ2005	Operating Systems	3	
		CZ2006	Software Engineering	3	
		CZ2007	Database Systems	3	
		CZ3001	Advanced Computer Architecture	3	
		CZ3002	Advanced Software Engineering	3	
		CZ3003	Software Systems Analysis and Design	3	
		CZ3005	Artificial Intelligence	3	
		CZ3006	Net Centric Computing	3	
		CZ3007	Compiler Techniques	3	
		CZ3004	Multidisciplinary Design Project	4	
		CZ3179	Internship	10	
		CZ4079	Final Year Project	8	
	Core Elective	CZ4xxx	CZ Technical Elective 1	3	18 AUs
		CZ4xxx	CZ Technical Elective 2	3	
		CZ4xxx	CZ Technical Elective 3	3	
		CZ4xxx	CZ Technical Elective 4	3	
		CZ4xxx	CZ Technical Elective 5	3	
		CZ4xxx	CZ Technical Elective 6	3	
General Education Requirements (GER)	**GER (Core)**	HW0188	Engineering Communication I	2	14 AUs
		HW0288	Engineering Communication II	2	
		ML0003	Professional Development Course	1	
		CZ0001	Engineers and Society	3	
		GC0001	Introduction to Sustainability: Multidisciplinary Approaches and Solutions	1	
		HY0001	Ethics and Moral Reasoning	1	
		ET0001	Entreprise and Innovation	1	

		CZ1015	Introduction to Data Science and Artificial Intelligence	3	
	GER(BM) **GER(LA)** **GER(STS)**	HE1001 HE1002 HE1005	Microeconomic Principles Macroeconomic Principles Introduction to Probability & Statistical Inference	3 3 3	9 AUs
	UE		Any of HE2001, HE2002, HE2005, HE4010, Econs Major PEs		15 AUs
			TOTAL	**140 AUs**	