B.E. Computer Science at BITS Pilani and B.S. Computer Engineering at UB

Program Plan, Semester wise Pattern and Credit Arrangements

Schedule A1 – Credit Map detailing

The collaborative 'dual degree' programmes at the international level will be offered in collaboration with University at Buffalo in the same specialization and at the same qualification level. The general curricular structure for the students admitted under Augmented Collaborative Articulation Pathway under BITS-UB collaboration is given in **Table 1**. In this 4-year collaborative 'dual degree' programme, students will spend the first two years along with a summer term (if required) at BITS Pilani campuses before transferring to the University at Buffalo in the USA for the remaining two years (i.e., years 3 and 4) of their study period. To fulfil the requirements, the programme mapping has been done to fulfil the degree requirements of both the Universities. The semester-wise pattern for students admitted to B.E. Computer Science (BITS) / B.S. Computer Engineering (UB) programme to be offered under BITS – UB is given below.

The courses mentioned in the semester-wise pattern in years 1 and 2 along with the summer term (if any) will be offered at BITS Pilani Campuses whereas those courses specified in years 3 and 4 will be offered at UB. The Equivalent Unit may be considered by assuming that a course of 1 unit offered at BITS Pilani is equivalent to a 1 credit point course offered by UB. The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani and UB. Accordingly, the UB credit points will be converted into BITS course units, and for the UB degree UB will transfer the number of credits assigned by BITS to its courses.

Table 1: Semester-wise Pattern for Students Admitted to B.E. Computer Science at BITS Pilani and B.S. Computer Engineering at UB under BITS – UB 2+2 International Collaborative Programmes

Semester-wise Pattern for Students Admitted to B.E. Computer Science under BITS – UB								
Year	**First Semester**			**U**	**Second Semester**			**U**
	BIO	F110	Biology Laboratory①	1	MATH	F112	Mathematics II ⑩	3
	BIO	F111	General Biology②	3	ME	F112	Workshop Practice ⑪	2
	CHEM	F110	Chemistry Laboratory ③	1	BITS	F111	Thermodynamics ⑫	3
	CHEM	F111	General Chemistry ④	3	CS	F111	Computer Programming ⑬	4
	MATH	F111	Mathematics I ⑤	3	MATH	F113	Probability and Statistics ⑭	3
	PHY	F110	Physics Laboratory ⑥	1	EEE	F111	Electrical Sciences ⑮	3
	PHY	F111	Mechanics, Oscillations and Waves ⑦	3	PHY	108	Physics ⑯	4
	BITS	F110	Engineering Graphics ⑧	2				
	ELI	100 or 105	Intro to Academic Writing or Writing and Rhetoric (offered by UB to fulfill UBC CL1 requirement) ⑨	3 Or 4				
				20/21				**22**

Semester-wise Pattern for Students Admitted to B.E. Computer Science under BITS – UB								
Year	**First Semester**			**U**	**Second Semester**			**U**
Summer Term								
ELI 105: Writing and Rhetoric only if students were placed into ELI 100 in first fall term (Students who do not meet placement requirements. These students would then take ELI 105 in the summer between Year 1 and Year 2, remotely online offered by UB). ⑰				4				
Humanities Elective (The course is required to offered to fulfill Humanities Elective Requirement at BITS Only) ⑱				3				
II	MATH	F211	Mathematics III ⑲	3	ECON Or MGTS	F211 Or F211	Principles of Economics ㉕ Or Principles of Management ㉕	3
	CS	F214	Logic in Computer Science ⑳	3	CS	F211	Data Structures & Algorithms ㉖	4
	CS	F222	Discrete Structure for Computer Science㉑	3	CS	F212	Database Systems ㉗	4
	CS	F213	Object Oriented Programming ㉒	4	CS	F351	Theory of Computations ㉘	3
	CS	F215	Digital Design ㉓	4	BITS	F225	Environmental Studies ㉙ **<PW1>**	3
	EAS	360	STEM Communications ㉔	3	DIV		Thematic Pathway List 1 Course to satisfy Diversity requirement ㉚ **<PW2>**	3
				20				**20**
Year	**First Semester**			**U**	**Second Semester**			**U**
III	EE	310	Electronic Devices and Circuits I ㉛	3	CSE	305	Introduction to Programming Languages ㊱	4
	CSE	220	Systems Programming ㉜	4	CSE	341	Computer Organization ㊲	4
	MTH	309	Linear Algebra ㉝	4	CSE	379	Microprocessors ㊳	4
	EE	312	Basic Electronic Instrumentation Lab ㉞	2	CSE	431	Algorithms Analysis and Design ㊴	3
	EAS	198	UB Seminar ㉞	1				
	PHY	158	General Physics II Lab㉟	1				
				15				**15**
IV	CSE	450	Hardware/Software Integrated Systems Design I ㊵	3	CSE	453	Hardware/Software Integrated Systems Design 2 ㊺	3
	CSE	321	Real -Time and Embedded Operating Systems ㊶	4	CSE	489	Modern Networking Concepts ㊻	3
	CSE	460	Data Models and Query Languages ㊷	3	CSE	490	Computer Architecture ㊼	3
	PW		Pathway Course ㊸**<PW3>**	3	PW		Pathway Course ㊽ **<PW4>**	3
	CSE	421	Introduction to Operating Systems ㊹	3	CSE	443	Compilers ㊾	4
					UBC	399	UB Curriculum Capstone ㊿	1
				16				**17**

Note: Units/Credit points earned for the course(s) in BITS Pilani and UB shall be considered towards degrees to be awarded by both institutions in accordance with the following:

1. To complete the BITS Pilani Degree, students need to complete a minimum total of 146 units with a minimum number of 47 courses (four courses with 13 BITS units delivered by UB (online) + twenty-five courses with 72 units (min.) offered by BITS in first two years + eighteen courses with 61 equivalent units offered by UB). The Equivalent Unit is considered by assuming that a course of 1 units offered at BITS Pilani is equivalent to a 1 credit points course offered by UB.

2. To complete the UB degree, students follow degree requirements in effect in the UB Undergraduate Catalogue as of the date they initially enroll in the UBITS programme; accordingly, they need to complete 37 course-based requirements in total (4 courses offered online by UB in the first two years and 14 mapped courses offered by BITS in the first two years + 19 courses offered by UB in the final two years); more than 50% of the UB degree requirements must be delivered by UB to comply with SUNY policy.
3. Upon completion of all BITS Pilani Courses during Years 1 and 2 (including summer term, if any) at the BITS Campus, students will receive 47 credit points as a UB credit exemption (UB transfer credit) against the 14 mapped courses to complete the UB Degree in accordance with UB's policies and procedures; not all BITS course transferred to UB will apply to UB degree requirements.
4. Upon completion of all UB Courses, students will receive 74 (=13+61) units of transfer credit for the 22 (=4+18) mapped courses to complete the BITS Pilani Degree in accordance with BITS' policies and procedures.
5. The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani and UB.
6. The details of an encircled number given against the selected courses in the semester-wise pattern are given below:

Symbol	Description
①	Course BIO F110: Biology Laboratory is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
②	Course BIO F111: General Biology is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani. This course will satisfy a 100-Level Technical Elective (CSE 199 substitute) requirement at UB. (Students may be allowed to choose even other BITS courses (e.g., BITS F111, MATH F112, CS F212, CS F214, CS F351) to satisfy UB's 100-level requirement, but this course seems just as good as any other, and can be used consistently between programs).
③	Course CHEM F110: Chemistry Laboratory is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to CHE 113: General Chemistry at UB, and an acceptable substitute for the CHE 127: General Chemistry for Engineers Laboratory 1 degree requirement at UB.
④	Course CHEM F111: General Chemistry is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to CHE 999 at UB, and an acceptable substitute for the CHE 107: General Chemistry for Engineers 1 degree requirement at UB.
⑤	Course MATH F111: Mathematics I is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to MTH 241: Calculus 3 a required course offered at UB. (Note: Though the Courses MTH 141: Calculus 1 & MTH 142: Calculus 2 are the foundation courses offered at UB, their course contents are overlapping with the NCERT syllabus, which are studied by the students at their Higher secondary level. Therefore, MTH 141: Calculus 1 & MTH 142: Calculus 2 requirements at UB shall be waived).
⑥	Course PHY F110: Physics Laboratory is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to PHY 151: Physics Lab 1 at UB. This course will not satisfy a degree requirement at UB.
⑦	Course PHY F111: Mechanics, Oscillations and Waves is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to PHY 107: General Physics 1 a required course offered at UB.
⑧	Course BITS F110: Engineering Graphics is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to EAS 999TR177/MAE 177: Engineering Drawing and CAD at UB. This course will not satisfy a degree requirement at UB.
⑨	Course ELI 105: Writing and Rhetoric is the required UB Curriculum course offered at UB. It would be offered by UB to fulfill UB requirement through online mode. It may be considered as Open

	Elective for BITS requirement by mapping with courses such as HSS F224 English Skills for Academic, GS F223 Introduction to Mass Communication or GS F325 Journalism or GS F326 Creative Thinking or GS F344 Copywriting. This course can be considered as the 1st Open Elective course out of 5 required at BITS.
⑩	Course MATH F112: Mathematics II is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
⑪	Course ME F112: Workshop Practice is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
⑫	Course BITS F111: Thermodynamics is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
⑬	Course CS F111: Computer Programming is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to CSE 115: Introduction to Computer Science I / EAS 230: Engineering Computations a required course offered at UB.
⑭	Course MATH F113: Probability and Statistics is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to EAS 305: Applied Probability and Statistics, a required course offered at UB.
⑮	Course EEE F111: Electrical Sciences is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to EE 202: Circuit Analysis a required course offered at UB.
⑯	Course PHY 108: Physics 2 is the required course offered at UB. It would be offered by UB to fulfill UB requirement through online mode. It may be considered as Open Elective for BITS Requirement.
⑰	ELI 105: Writing and Rhetoric is required only if students were placed into ELI 100 in first fall term (Students who do not meet placement requirements would then take ELI 105 in the summer between Year 1 and Year 2, offered remotely by UB).
⑱	The course is required to fulfill Humanities Elective Requirement at BITS Only. This would be the 1st Humanities Elective (HUEL) out of total required 3 HUELs. This course will not satisfy a degree requirement at UB.
⑲	Course MATH F211: Mathematics III is a compulsory foundation course at BITS Pilani. It will be considered as equivalent to MTH 306: Differential Equations a required course offered at UB.
⑳	Course CS F214: Logic in Computer Science is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
㉑	Course CS F222: Discrete Structure for Computer Science is a required core course at BITS Pilani. It will be considered as equivalent to CSE 191: Introduction to Discrete Structures a required course offered at UB.
㉒	Course CS F213: Object Oriented Programming is a required core course at BITS Pilani. It will be considered as equivalent to CSE 116: Introduction to Computer Science II a required course offered at UB.
㉓	Course CS F215: Digital Design is a required core course offered at BITS Pilani. It will be considered as equivalent to CSE 241: Digital Systems a required course offered at UB.
㉔	Course EAS 360: STEM Communications is the required course offered at UB. It will be offered by UB through online mode. It will be considered as an equivalent to BITS F112: Technical Report Writing a required foundation course at BITS Pilani.
㉕	Course ECON F211 Principles of Economics OR MGTS F211: Principles of Managements is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
㉖	Course CS F211: Data Structures & Algorithms is a required core course at BITS Pilani. It will be considered as an equivalent to CSE 250: Data Structures a required course offered at UB.

㉗	Course CS F212: Database Systems is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
㉘	Course CS F351: Theory of Computations is a required course at BITS Pilani. It will be offered to meet the graduation requirements of BITS Pilani only.
㉙	BITS F225: Environmental Studies is a required foundation course at BITS. It will be considered equivalent to EVS 118: Intro Environment and Sustainability Studies offered at UB. EVS 118: Intro Environment and Sustainability Studies also fulfills the requirement of a course at UB offered under Thematic Pathway category. Thus, it will fulfill the requirement of 1st course under Thematic Pathway (Environment Track) out of the total required 9 credits required under the Thematic Pathway category.
㉚	This would be the 2nd Humanities Elective (HUEL) out of total required 3 HUELs. The course will also fulfill the requirement of a course at UB offered under Thematic or Global Pathway category. Each Pathway requires 9 credits, and the credits from this course will count toward either of the two Pathway categories, depending on the course offered in the semester. In addition, this course will satisfy the Diversity in the United States requirement. This course will be offered by UB through online mode.
㉛	Course EE 310: Electronic Devices & Circuits 1 is the required course offered at UB. Also, this course will be considered as the 3rd Open Elective for BITS Requirement.
㉜	Course CSE 220: Systems Programming is the required course offered at UB. Also, this will be considered as the 1st Discipline Elective course out of 4 required at BITS.
㉝	Course MTH 309: Introductory Linear Algebra is the required course offered at UB. Also, this course will be considered as the 4th Open Elective for BITS requirement.
㉞	Course EE 312: Basic Electronic Instrumentation Lab is a required course offered at UB. Course EAS 198: UB Seminar is necessary to satisfy UB Curriculum (general education) requirements at UB. If students complete EE 312 and EAS 198, BITS will consider it equivalent to CS F366: Lab Project and this course will be considered as the 5th Open Elective for BITS Requirement.
㉟	Course PHY 158: General Physics II Lab is the required course offered at UB. It will be offered to meet graduation requirements of UB only.
㊱	The course CSE 305: Introduction to Programming Languages required to be offered by UB to fulfill the requirements of BITS Pilani. BITS-UB Students shall take the course and this will be considered as equivalent to a required core course CS F301: Principles of Programming Language offered at BITS Pilani in 3rd Year. This course will satisfy the CSE 300/400-Level Technical Elective requirement at UB.
㊲	Course CSE 341: Computer Organization is the required course offered at UB. Also, this will be considered as the 2nd Discipline Elective course out of 4 required at BITS.
㊳	CSE 379: Introduction to Microprocessor is the required course at UB. This course will be equivalent to CS F241: Microprocessors and Interfacing, a required core course offered at BITS.
㊴	The course CSE 431: Algorithms Analysis and Design required to be offered by UB to fulfill the requirements of BITS Pilani. BITS-UB Students shall take the course and this will be considered as equivalent to a required core course CS F364: Design & Analysis of Algorithms offered at BITS Pilani in 3rd Year. This course will satisfy a CSE 400-Level Technical Elective requirement at UB.
㊵	Course CSE 450: Hardware/Software Integrated Systems Design I is a required course offered at UB. Also, this course will be considered as equivalent to the course BITS F456: Capstone Project I a required course offered at BITS Pilani. This is the 1st Capstone Project out of 2 required at BITS. All BITS-UB students have to do two Capstone Projects in place of Practice School II/Thesis.

㊶	Course CSE 321: Real -Time and Embedded Operating is a required course offered at UB. Also, this course will be considered as the 3rd Discipline Elective out of 4 required at BITS.
㊷	Course CSE 460: Data Model and Query Languages required to be offered by UB to fulfill the requirements of BITS Pilani. BITS-UB Students shall take the course and this will be considered as the 4th Discipline Elective course out of 4 required at BITS. This course will not satisfy a degree requirement at UB.
㊸	This would be the 3rd Humanities Elective (HUEL) out of total required 3 HUELs. Students should select this course in such a way that the selected course will not only fulfill the requirement of a course at UB offered under Thematic or Global Pathway category but also fulfill Humanities electives requirement of BITS Pilani. Thus, it will fulfill the requirement of 3rd course under Thematic or Global Pathway category out of the total required 4 courses required under this category.
㊹	The course CSE 421: Introduction to Operating Systems required to be offered by UB to fulfill the requirements of BITS Pilani. BITS-UB Students shall take the course and this will be considered as equivalent to a required core course CS F372: Operating Systems offered at BITS Pilani in 3rd Year. This course will satisfy a CSE 400-Level Technical Elective requirement at UB.
㊺	Course CSE 453: Hardware/Software Integrated Systems Design 2 is a required course offered at UB. Also, this course will be considered as equivalent to the course BITS F457: Capstone Project II a required course offered at BITS Pilani. This is the 2nd Capstone Project out of 2 required at BITS. All BITS-UB students have to do two Capstone Projects in place of Practice School II/Thesis.
㊻	The course CSE 489: Modern Networking Concepts required to be offered at UB. BITS-UB Students shall take the course and this course will be considered as equivalent to a required core course CS F303: Computer Networks offered at BITS Pilani in 3rd Year. This course will not satisfy a degree requirement at UB.
㊼	Course CSE 490: Computer Architecture is the required course offered at UB. Also, this course will be considered as equivalent to CS F342: Computer Architecture a required core course offered at BITS Pilani in 3rd Year.
㊽	This course will be considered as an additional Open Elective for the BITS Requirement. Students should select this course in such a way that the selected course will not only fulfill the requirement of a course at UB offered under Thematic or Global Pathway category but also fulfill open elective requirement of BITS Pilani. Thus, it will fulfill the requirement of 4th course under Thematic or Global Pathway category out of the total required 4 courses required under this category.
㊾	The course CSE 443: Compilers required to be offered by UB to fulfill the requirements of BITS Pilani. BITS-UB Students shall take the course and this will be considered as equivalent to a required core course CS F363: Compiler Construction offered at BITS Pilani in 3rd Year. This course will satisfy the SEAS 400-Level Technical Elective requirement at UB.
㊿	Course UBC 399: UB Curriculum Capstone is the required course offered at UB. It will be offered to meet graduation requirements of UB only.

Schedule B1: Credit Map details from the perspective of the BITS Pilani degree

BITS Pilani Credit Arrangements in Years 1 and 2 BITS Campus locations

During Years 1 and 2 of the programme, students are enrolled in the BE Computer Science program at BITS Pilani and are prospective/non-matriculated students in the BS Computer Engineering program at University at Buffalo (UB), completing the following courses. There will be 25 courses with 72 Units offered by BITS Pilani (during Year I and Year II to fulfill partial requirement of award of BITS Pilani Degree). These courses will be entirely taught by BITS with the number of delivery hours being determined by BITS.

S. No.	Course Code	Course Title	Unit
1	BIO F110	Biology laboratory	1
2	BIO F111	General Biology	3
3	CHEM F110	Chemistry Laboratory	1
4	CHEM F111	General Chemistry	3
5	PHY F110	Physics Laboratory	1
6	PHY F111	Mechanics, Oscillations and Waves	3
7	BITS F110	Engineering Graphics	2
8	MATH F111	Mathematics I	3
9	MATH F112	Mathematics II	3
10	MATH F113	Probability & Statistics	3
11	MATH F211	Mathematics III	3
12	BITS F111	Thermodynamics	3
13	EEE F111	Electrical Sciences	3
14	CS F111	Computer Programming	4
15	ME F112	Workshop Practice	2
16	BITS F225	Environmental Studies	3
17	CS F211	Data Structures & Algorithms	4
18	CS F212	Database Systems	4
19	CS F213	Object Oriented Programming	4
20	CS F214	Logic in Computer Science	3
21	CS F215	Digital Design	4
22	CS F222	Discrete Structures for Computer Science	3
23	CS F351	Theory of Computation	3
24	ECON F211/ MGTS F211	Principles of Economics/ Principles of Management	3
25	-	Humanities Elective	3
			72

BITS Pilani Credit Arrangements in Years 1 and 2: UB Remote Courses

During Years 1 and 2 of the programme, students are enrolled in the BE Computer Science program at BITS Pilani and are prospective/non-matriculated students in the BS Computer Engineering program at University at Buffalo (UB), completing the following courses offered by UB in the online mode. There will be 4 courses (earning 14 UB credit hours and 13 BITS Units) offered by UB (during Year I and Year II to fulfill partial requirement of award of BITS Pilani and UB Degree). These courses will be entirely taught by UB through online mode with the number of delivery hours being determined by UB.

S. No.	UB Courses			BITS Pilani Courses		
	Code	Course Title	Unit	Code	Course Title	Unit
1	ELI 105	Writing and Rhetoric	4	-	Open Elective	4
2	PHY 108	Physics 2	4	-	Open Elective	4
3	EAS 360	STEM Communications	3	BITS F112	Technical Report Writing	2
4	Thematic or Global Pathway category		3		2nd Humanities Elective	3
		Total	14			13

Note: UB and BITS may agree to change the division of student contact hours between both parties, subject to Indian regulatory requirements and UB policy. Any changes must be agreed in writing between both parties.

BITS Pilani Credit Arrangements in Years 3 and 4 at University at Buffalo Campus locations

Upon successful completion of Years 1 and 2 of the programme, students will relocate to the UB campus and transfer into the BITS-UB program plan. Students will have to complete 63 credit points for 21 Courses at UB in Year 3 and 4 to fulfil UB requirements. Out of these 21 courses, 19 Courses with 61 credit points/units (listed below) offered by UB during 3rd & 4th Year would be considered for the requirement of BITS Pilani Degree.

S. No.	UB Courses			BITS Pilani Courses		
	Code	Course Title	Unit	Code	Course Title	Unit
1	EE 310	Electronic Devices and Circuits I	3	-	3rd Open Elective	3
2	CSE 220	Systems Programming	4	-	1st Discipline Elective	4
3	CSE 421	Introduction to Operating Systems	3	CS F372	Operating Systems (Core Course)	3
4	MTH 309	Linear Algebra	4	-	4th Open Elective	3
5	EE 312	Basic Electronic Instrumentation Laboratory	2	-	5th Open Elective (CS F366 Lab Project)	3
6	EAS 198	UB Seminar	1			
7	CSE 305	Introduction to Programming Languages	4	CS F301	Principles of Programming Languages (Core Course)	2
8	CSE 341	Computer Organization	4	-	2nd Discipline Elective	4
9	CSE 379	Introduction to Microprocessors	4	CS F241	Microprocessors & Interfacing	4
10	CSE 431	Algorithms Analysis and Design	3	CS F364	Design and Analysis of Algorithms (Core Course)	3
11	CSE 443	Compilers	4	CS F363	Compiler Construction (Core Course)	3
12	CSE 450	Hardware/Software Integrated Systems Design I	3	BITS F456	Capstone Project I	4
13	CSE 453	Hardware/Software Integrated Systems Design 2	3	BITS F457	Capstone Project II	4
14	CSE 321	Real -Time and Embedded Operating Systems	4	-	4th Discipline Elective	4
15	CSE 460	Data Models and Query Languages	3	-	3rd Discipline Elective	3
16		Thematic or Global Pathway category	3		3rd Humanities Elective	3
17	CSE 489	Modern Networking Concepts	3	CS F303	Computer Networks (Core Course)	4

S. No.	UB Courses			BITS Pilani Courses		
	Code	Course Title	Unit	Code	Course Title	Unit
18	CSE 490	Computer Architecture	3	CS F342	Computer Architecture (Core Course)	4
19	Thematic or Global Pathway category		3		6th Open Elective	3
		Total	**61**		**Total**	**61**

Schedule B2 – Credit Map details from the perspective of the UB degree

UB Credit Arrangements in Years 1 and 2 at BITS Campus locations

During Years 1 and 2, students enrolled in the BE Computer Science program at BITS Pilani and as prospective/non-matriculated students in the BS Computer Engineering program at University at Buffalo (UB) receive 14 credits from online courses delivered by UB and 44 credits taught at BITS. In addition, two math courses (8 credits in total) will be waived. Overall, a total of 58 credits from 18 courses (14 online UB and 44 BITS courses) earned from Years 1 and 2 count toward UB degree requirements, and 8 credits from two math courses that are required for UB degree will be waived.

Upon successful completion of Year 1 and Year 2 study at BITS Campus locations and subject to the issuance of a US student visa by the relevant Authorities, students will transfer to the UB Campus) and shall be waived the following two courses.

S. No.	Course Code	Course Title	Unit
1	MATH 141	College Calculus I	4
2	MATH 142	College Calculus 2	4
	Total		**8**

UB Credit Arrangements in Years 1 and 2 UB Campus locations (Online mode)

During Years 1 and 2, students are enrolled in the BE Computer Science programme at BITS Pilani and are prospective/non-matriculated students in the BS Computer Engineering program at University at Buffalo (UB), completing the following courses offered by UB in the online mode. There will be 4 courses (14 UB credits and 13 BITS units) offered by UB (during Year 1 and Year 2 to fulfill partial requirement of the BITS Pilani and UB degrees). These courses will be entirely taught by UB in online mode with the number of delivery hours being determined by UB.

S. No.	UB Courses			BITS Pilani Courses		
	Code	Course Title	Unit	Code	Course Title	Unit
1	*ELI 105	Writing and Rhetoric	4	-	Open Elective	4
2	PHY 108	Physics 2	4	-	Open Elective	4
3	EAS 360	STEM Communications	3	BITS F112	Technical Report Writing	2
4	Thematic or Global Pathway category		3		2nd Humanities Elective	3
		Total	14			13

Note: UB and BITS may agree to change the division of student contact hours between both parties, subject to Indian regulatory requirements and UB policy. Any changes must be agreed in writing between both parties.

** To be eligible to enroll in ELI 105 students for whom English is not a first or dominant language (Placement determined by English Proficiency Test Type & Minimum Scores section of the admission brochure), must successfully complete ELI 100 with a "C" grade or higher.*

Upon successful completion of the courses delivered at BITS Campus locations in Year 1 and Year 2, students will satisfy 14 UB degree requirements noted below.

S. No.	UB			BITS Pilani		
	Code	**Course Title**	**Unit**	**Code**	**Course Title**	**Unit**
1	BIO 200	Evolutionary Biology (satisfies 100-level technical elective)	3	BIO F111	General Biology	3
2	CHE 113	General Chemistry (equivalent to CHE 127)	1	CHEM F110	Chemistry Laboratory	1
3	CHE 999	Chemistry 1 (equivalent to CHE 107)	3	CHEM F111	General Chemistry	3
4	MTH 241	Calculus 3	3	MATH F111	Mathematics I	3
5	PHY 107	General Physics 1	3	PHY F111	Mechanics, Oscillations and Waves	3
6	CSE 115 / EAS 230	Engineering Computations	4	CS F111	Computer Programming	4
7	EAS 305	Applied Probability and Statistics	3	MATH F113	Probability & Statistics	3
8	EE 202	Circuit Analysis	3	EEE F111	Electrical Sciences	3
9	MTH 306	Differential Equations	3	MATH F211	Mathematics III	3
10	CSE 191	Introduction to Discrete Structures	3	CS F222	Discrete Structures for Computer Science	3
11	CSE 116	Introduction to Computer Science II	4	CS F213	Object Oriented Programming	4
12	CSE 241	Digital Systems	4	CS F215	Digital Design	4
13	CSE 250	Data Structures	4	CS F211	Data Structures & Algorithms	4
14	EVS 118	Intro Environment and Sustainability Studies (satisfies Thematic Pathway requirement)	3	BITS F225	Environmental Studies	3
		Total	**44**			**44**

Note: In addition to the courses in the table, UBITS students take additional ten BITS courses (such as BIO F110, BITS F110, BITS F111, CS F212, CS F214, CS F351, ECON F211, MATH F112, ME F112, PHY F110) in Years 1 and 2 to satisfy BITS degree requirements. While the credits from these courses transfer to UB, none of the credits from the courses will satisfy a UB degree requirement.

Students enrolled into the 2+2 UBITS International Collaborative Programme are required to transfer to the UB Campus in USA to complete Year 3 and Year 4 program requirements. In order to progress to the University at Buffalo as part of the BITS-UB International Collaboration Programme, students should have at the end of their first two years a CGPA of at least 6.0, with no BITS course fulfilling a UB degree requirement having a grade below D (grade point 4.0) in such courses. In addition, students must receive passing grades (D grade or better) in courses completed via the UB online mode that serve as prerequisites for other UB degree requirements.

For more details of UB conditions, UB website may be referred.

UB Credit Arrangements in Years 3 and 4 at University at Buffalo Campus locations

Upon successful completion of Years 1 and 2 of the programme, students will relocate to the UB campus and transfer into the BITS-UB program plan. Students will have to complete 57 credit points for 19 Courses at UB in Year 3 and 4 to fulfil UB requirements. These **19 Courses** with **57 credit points/units** (listed below) offered by UB during 3rd & 4th Year will be considered for the requirement of UB Degree. Also, some of these courses would also be considered as the compulsory core courses requirement of BITS Degree.

S. No.	Course Code	Course Title	Unit
1	EE 310	Electronic Devices and Circuits I	3
2	CSE 220	Systems Programming	4
3	CSE 421	Introduction to Operating Systems (CSE 400-Level Technical Elective)	3
4	MTH 309	Linear Algebra	4
5	EE 312	Basic Electronic Instrumentation Laboratory	2
6	EAS 198	UB Seminar	1
7	PHY 158	General Physics II Laboratory	1
8	CSE 305	Introduction to Programming Languages (CSE 300/400-Level Technical Elective)	4
9	CSE 341	Computer Organization	4
10	CSE 379	Introduction to Microprocessor	4
11	CSE 431	Algorithms Analysis and Design (CSE 400-Level Technical Elective)	3
12	CSE 443	Compilers (SEAS 400-Level Technical Elective)	4
13	CSE 450	Hardware/Software Integrated Systems Design I	3
14	CSE 453	Hardware/Software Integrated Systems Design 2	3
15	CSE 321	Real -Time and Embedded Operating Systems	4
16		Thematic or Global Pathway category	3
17	CSE 490	Computer Architecture	3
18		Thematic or Global Pathway category	3
19	UBC 399	UB Curriculum Capstone	1
		Total	**57**

Note: In addition to the courses in the table, UBITS students take two UB courses (CSE 460: Data Models and Query Languages and CSE 489: Modern Networking Concepts) in Years 3 and 4 to fulfill BITS degree requirements; however, these courses do not satisfy a UB degree requirement.