B.E. Computer Science at BITS and B.E. in Computer Science & Artificial Intelligence at CSP

Program Plan, Semester wise Pattern and Credit Arrangements

Schedule A1 – Credit Map detailing

The collaborative 'dual degree' programme at the international level will be offered in collaboration with CentraleSupélec Paris (CSP) in the same specialization and at the same qualification level. The general curricular structure and semester-wise pattern for the students admitted under Collaborative Articulation Pathway for BITS-CSP collaborative programme is given in **Table 1.** To fulfil the requirements, a few new courses may be introduced later, if required.

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 getting transferred to CentraleSupélec Paris in the France for the remaining two years (i.e., years 3 and 4) of their study period. 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 CSP. The Equivalent Unit may be considered by assuming that a course of 2 Units offered at BITS Pilani is equivalent to a 3 ECTS course offered by CSP. The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani and CSP. Accordingly, the CSP credit points will be converted into BITS course units and vice versa by making appropriate equivalency of these courses. Students enrolled into the 2+2 BITS-CSP International Collaborative Programme are required to transfer to the CSP Campus in France to complete Year 3 and Year 4 program requirements. In order to progress to the CentraleSupélec Paris as part of the BITS-CSP International Collaboration Programme, students should have at the end of their first two years a CGPA of at least 5.5.

Table 1: Semester-wise Pattern for Students Admitted to B.E. Computer Science under BITS – CSP								
Year	**First Semester**			**U**	**Second Semester**			**U**
I	BIO	F101	Introduction to Biological Sciences①	3	ME	F112	Workshop Practice⑥	2
	CHEM	F101	Fundamentals of Chemistry②	3	BITS	F111	Thermodynamics ⑦	3
	MATH	F101	Multivariable Calculus③	3	CS	F111	Computer Programming⑧	4
	PHY	F101	Oscillations and Waves ④	3	EEE	F111	Electrical Sciences ⑨	3
	BITS	F234	Introduction to Engineering Design⑤	4	MATH	F102	Linear Algebra and Complex Variables ⑩	3
	BITS	F101	Navigating Campus Life and Living Well⑫	1	MATH	F113	Probability and Statistics ⑪	3
	BITS	K101	Physical Fitness, Health Well-being and Creative Arts ⑫		BITS	F112	Technical Report Writing	2
					BITS	F102	Innovation and Design Thinking ⑫	1
							Language Course (French) ⑬	1
				17				**22**
Year	**First Semester**			**U**	**Second Semester**			**U**
II	MATH	F211	Mathematics III ⑪	3	ECON Or MGTS	F211 Or F211	Principles of Economics ⑲ Or Principles of Management⑲	3
	CS	F213	Object Oriented Programming⑭	4	CS	F211	Data Structures & Algorithms⑳	4
	CS	F214	Logic in Computer Science⑮	3	CS	F212	Database Systems ㉑	4
	CS	F215	Digital Design⑯	4	CS	F241	Microprocessors & Interfacing ㉒	4
	CS	F222	Discrete Structures for Computer Science⑰	3	BITS	F225	Environmental Studies ㉓	3
	CS	F320	Foundations of Data Science⑱	3			Language Course (French) ⑬	2
				20 (min)				**20 (min)**
Year	**Summer Term**							**U**
	BITS	F221	Practice School I㉔					**5**
Year	**First Semester**			**ECTS**	**Second Semester**			**ECTS**
III			Theory of Computation㉕	4.5			Compilers㉜	4.5
			Operating systems㉖	6			Advanced Algorithms㉝	4.5
			Principles of Programming Languages㉗	3			Computer Networks㉞	6
			Computer Architectures and Software Execution Process㉘	6			Foundations of Machine Learning and Neural Networks㉟	5.5
			Introduction to Artificial Intelligence㉙	3			Reinforcement Learning㊱	4.5
			Deep Learning㉚	4.5			Language Course (French) ⑬	3
			Open Elective㉛	3			Open Elective㊲	2
				30				**30**
Year	**First Semester**			**ECTS**	**Second Semester**			**ECTS**

Table 1: Semester-wise Pattern for Students Admitted to B.E. Computer Science under BITS – CSP								
Year	**First Semester**			**U**	**Second Semester**			**U**
IV			Fundamentals of Cloud Computing ㊳	3			Internship㊼	30
			Stochastic Processes & Diffusion Networks㊴	3				
			e-Business and Digital Disruption㊵	3				
			Leading and Managing Teams㊶	3				
			International Negotiations㊷	3				
			Computer Vision㊸	3				
			Real Time Systems㊹	3				
			Quantum Computing㊺	3				
			Language Course (French) ⑬	3				
			Final Year Project㊻	3				
				30				**30**

Course sequences to be taken in years 3 and 4 at CSP are tentative and may change slightly. Academic advisors at CSP will work with students to set exact schedules upon entry to CSP.

The details of an encircled number given against the selected courses in the semester-wise pattern are given below:

Symbol	Description
①	**BIO F101: Introduction to Biological Sciences** is the compulsory foundation courses at BITS Pilani. This course will also be considered as equivalent to three courses **BIO111: Cell Biology, BIO121: Genetics & BIO211: Bioengineering (S3)** offered to fulfil the requirements at CSP.
②	**CHEM F101: Fundamentals of Chemistry** is the compulsory foundation course at BITS Pilani. This course will also be considered as equivalent to four courses **CHEM111: Chemistry I, CHEM112: Chemistry II, CHEM121: Chemistry III & CHEM211: Thermochemistry (S3)** offered to fulfil the requirements at CSP.
③	**MATH F101: Multivariable Calculus** is the compulsory foundation course at BITS Pilani. It will also be considered as equivalent to two courses **MAA111: Analysis 1 & MAA112: Analysis 2** offered to fulfil the requirements at CSP.
④	**PHY F101: Oscillations and Waves** is the compulsory foundation course at BITS Pilani. This course will also be considered as equivalent to two courses **PHY111: Introduction to classical Mechanics & PHY122: Wave Physics** offered to fulfil the requirements at CSP.
⑤	**BITS F234: Introduction to Engineering Design** is a required course at BITS Pilani. It will

Symbol	Description
	be offered to fulfil the requirements of BITS Pilani only.
⑥	**ME F112: Workshop Practice & BITS F112: Technical Report Writing** are the compulsory foundation courses at BITS. These will be offered to fulfil the requirements of BITS Pilani only.
⑦	**BITS F111: Thermodynamics** is the compulsory foundation course at BITS Pilani. It will also be considered as equivalent to courses **PHY121: Thermodynamics** offered to fulfil the requirements at CSP.
⑧	**CS F111 Computer Programming** is the compulsory foundation course at BITS Pilani. It will also be considered as equivalent to four courses **CSE111: Introduction to Programming, CSE112: Coding Weeks (a 2 weeks mini bootcamp project), CSE121: Algorithms & CSE122: Intro to Information Systems** offered to fulfil the core discipline requirements at CSP.
⑨	**EEE F111: Electrical Sciences** is the compulsory foundation course at BITS Pilani. It will also be considered as equivalent to courses **PHY112: Introduction to Electrical Engineering** offered to fulfil the requirements at CSP.
⑩	**MATH F102: Linear Algebra and Complex Variables** is the compulsory foundation course at BITS Pilani. It will also be considered as equivalent to two courses **MAA121: Analysis 3 & MOD111: Introduction to Modeling** offered to fulfil the requirements at CSP.
⑪	**MATH F113**: **Probability and Statistics & MATH F211: Mathematics III** are the compulsory foundation courses at BITS Pilani. These two courses will also be considered as equivalent to four courses **MAA122: Probability and Statistics, MAA221: Numerical Methods, MAA211: Linear Algebra & MAA222: Statical Methods and Data Analysis** offered to fulfil the requirements at CSP.
⑫	**BITS F101: Navigating Campus Life and Living Well**, course **BITS K101: Physical Fitness, Health Well-being and Creative Arts**, and course **BITS F102: Innovation and Design Thinking** are the required courses at BITS Pilani. These will be offered to meet the graduation requirements of BITS Pilani only.
⑬	**Language Course (French)** will be offered in online mode by the CS Paris (CSP) during second semester of year 1 & 2. It will be offered to fulfil the requirements of CS Paris (CSP) only.
⑭	**CS F213: Object Oriented Programming** is the compulsory discipline core course at BITS Pilani. It will also be considered as equivalent to a discipline core course required to fulfill the academic requirements at CSP.
⑮	**CS F214: Logic in Computer Science** is the compulsory discipline core course at BITS Pilani. It will also be considered as equivalent to a discipline core course required to fulfill the academic requirements at CSP.
⑯	**CS F215: Digital Design** is the compulsory discipline core course at BITS Pilani. It will also be considered as equivalent to a discipline core course required to fulfill the academic requirements at CSP.
⑰	**CS F222: Discrete Structures for Computer Science** is the compulsory discipline core course

Symbol	Description
	at BITS Pilani. It will be offered to fulfil the requirements of BITS Pilani only.
⑱	**CS F320: Foundations of Data Science** is a discipline elective course at BITS Pilani. This will be the 1st discipline elective course out of 4 required at BITS Pilani. It will also be considered as equivalent to a discipline core course **Fundamentals of Data Science Programming** required to fulfill the academic requirements at CSP**.**
⑲	**ECON F211: Principles of Economics** OR **MGTS F211: Principles of Managements** is a required course at BITS Pilani. It will also be considered as equivalent to three courses **ECO211: Structure of Corporations, HSS111: Philosophy of Research, Science, and Technology & AIDAM238: Information Technology Law, Copyright, and Open Access** offered to fulfil the General Awareness requirements at CSP.
⑳	**CS F211: Data Structure and Algorithms** is the compulsory discipline core course at BITS Pilani. It will also be considered as equivalent to a discipline core course required to fulfill the academic requirements at CSP.
㉑	**CS F212: Database Systems** is the compulsory discipline core course at BITS Pilani. It will also be considered as equivalent to a discipline core course required to fulfill the academic requirements at CSP.
㉒	**CS F241: Microprocessors and Interfacing** is the compulsory discipline core course at BITS Pilani. It will be offered to fulfil the requirements of BITS Pilani only.
㉓	**BITS F225: Environmental Studies** is a required foundation course at BITS. It will also be considered as equivalent to courses **HSS1122: International Sustainable Development** offered to fulfil the General Awareness requirements at CSP.
㉔	**BITS F221: Practice School I** is a required course at BITS Pilani. Students enrolled in BITS-CSP 2+2 International Collaborative programme will complete this course during summer term after their second year (before transferred to CSP).
㉕	**Theory of Computation** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a discipline core course **CS F351: Theory of Computation** required to fulfill the academic requirements at BITS Pilani**.**
㉖	**Operating Systems** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a discipline core course **CS F372: Operating Systems** required to fulfill the academic requirements at BITS Pilani**.**
㉗	BITS-CSP students are advised to take the course **Principles of Programming Languages** offered at CSP. It will be considered as a discipline elective course at CSP. It will also be considered as equivalent to a discipline core course **CS F301: Principles of Programming Languages** required to fulfill the academic requirements at BITS Pilani.
㉘	**Computer Architectures and Software Execution Process** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a discipline core course **CS F342: Computer Architecture** required to fulfill the academic requirements at BITS Pilani**.**
㉙	**Introduction to Artificial Intelligence** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a course **CS F407: Artificial Intelligence** as a 1st Open elective course out of 5 required at BITS Pilani.
㉚	BITS-CSP students are advised to take the course **Deep Learning** offered at CSP. It will be

Symbol	Description
	considered as a discipline elective course at CSP. It will also be considered as equivalent to a course **CS F425: Deep Learning** as a 2nd discipline elective course out of 4 required at BITS Pilani.
㉛	BITS-CSP students have to take any one minimum of 3 ECTS course offered at CSP. It will be considered as an Open elective course at CSP. It will be offered to fulfil the academic requirements CSP only.
㉜	**Compilers** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a discipline core course **CS F363: Compiler Construction** required to fulfill the academic requirements at BITS Pilani**.**
㉝	**Advanced Algorithms** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a discipline core course **CS F364: Design & Analysis of Algorithms** required to fulfill the academic requirements at BITS Pilani**.**
㉞	**Computers Networks** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a discipline core course **CS F303: Computer Networks** required to fulfill the academic requirements at BITS Pilani**.**
㉟	**Foundations of Machine Learning and Neural Networks** is the compulsory discipline core course at CSP. It will also be considered as equivalent to a course **BITS F464: Machine Learning** as a 3rd discipline elective course out of 4 required at BITS Pilani.
㊱	BITS-CSP students are advised to take the course **Reinforcement Learning** offered at CSP. It will be considered as a discipline elective course at CSP. It will also be considered as equivalent to a course **CS F317: Reinforcement Learning** as a 4th discipline elective course out of 4 required at BITS Pilani.
㊲	BITS-CSP students have to take any one minimum of 2 ECTS course offered at CSP. It will be considered as an Open elective course at CSP. It will be offered to fulfil the academic requirements CSP only.
㊳	BITS-CSP students are advised to take the course **Fundamentals of Cloud Computing** offered at CSP. It will be considered as a discipline elective course at CSP. It will also be considered as equivalent to a course **CS G527: Cloud Computing** as a 2nd Open elective course out of 5 required at BITS Pilani.
㊴	BITS-CSP students are advised to take the course **Stochastic Processes & Diffusion Networks** offered at CSP. It will be considered as a discipline elective course at CSP. It will be offered to fulfil the academic requirements CSP only.
㊵	BITS-CSP students are advised to take the course **e-Business and Digital Disruption** offered at CSP. It will be considered as an Open elective course at CSP. It will be offered to fulfil the academic requirements CSP only.
㊶	BITS-CSP students are advised to take the course **Leading and Managing Teams** offered at CSP. It will be considered as an Open elective course at CSP. It will also be considered as equivalent to a course **BITS F419: Management of Cross Cultural Engineering Teams** as a 1st Humanities elective course out of 3 required at BITS Pilani.
㊷	BITS-CSP students are advised to take the course **International Negotiations** offered at CSP. It will be considered as an Open elective course at CSP. It will also be considered as

Symbol	Description
	equivalent to a course **HSS F346: International Relations** as a 2nd Humanities elective course out of 3 required at BITS Pilani.
㊸	BITS-CSP students are advised to take the course **Computer Vision** offered at CSP. It will be considered as a discipline elective course at CSP. It will also be considered as equivalent to a course **BITS F459: Computer Vision** as a 3rd Open elective course out of 5 required at BITS Pilani.
㊹	BITS-CSP students are advised to take the course **Real Time Systems** offered at CSP. It will be considered as a discipline elective course at CSP. It will also be considered as equivalent to a course **CS F444: Real–Time Systems** as a 4th Open elective course out of 5 required at BITS Pilani.
㊺	BITS-CSP students are advised to take the course **Quantum Computing** offered at CSP. It will be considered as a discipline elective course at CSP. It will also be considered as equivalent to a course **CS F316: Quantum Architecture and Programming** as a 5th Open elective course out of 5 required at BITS Pilani.
㊻	BITS-CSP students are advised to take the course **Final Year Project** offered at CSP. It will also be considered as equivalent to a course **HSS F266: Study Project** as a 3rd Humanities elective course out of 3 required at BITS Pilani.
㊼	Course **Internship** is the required course offered at CSP. Also, this course shall be considered as equivalent to a course **Practice School II** offered at BITS Pilani. All BITS-CSP students are required to do Practice School 1 and Practice School 2 (Internship).