2+2 International Collaborative Programmes at First Degree Level

BITS Pilani (an Institution of Eminence in India) and The Iowa State Ames have partnered to offer an exciting opportunity for students to pursue unique collaborative academic programmes at the international level. Students can opt to pursue a dual degree program whereby they can obtain an engineering degree from BITS Pilani and an engineering degree from Iowa State University upon successful completion of the program requirements.

Students admitted under this collaboration will have the unique opportunity to immerse themselves in diverse cultures and gain a truly global perspective. In this 4-year collaborative 'dual degree' programme, students will spend the first two years along with a summer term at BITS Pilani campuses before getting transferred to Iowa State University, Ames for the remaining two years (i.e., years 3 and 4) of their study period. Our innovative curriculum combines the strengths of both academic environments, offering an outstanding education that would prepare them for success in today's rapidly changing world. With state-of-the-art facilities, inspiring faculty, and a wide range of extracurricular activities, this collaboration would be the perfect place to launch students' productive academic and professional journeys.

The partnership between BITS Pilani and Iowa State University will include programmes spanning different academic disciplines that are desirable to students and expected to produce graduates who are in demand by industry and academia. Degrees will be awarded separately and simultaneously by the respective universities. Prospective students are required to meet the admission requirements of both BITS Pilani, India, and the respective collaborating universities. Finally, students shall be awarded degrees in the same discipline and at the same level.

The partnership includes a deeper engagement with the partner institution and students, including:

- Co-branded programmes with partner Institutions, including joint marketing, delivery, and operational responsibilities.
- Students are recruited through the existing BITSAT admissions process.
- Students will spend two years at BITS campuses before transferring to ISU in the USA.
- Students will have regular exposure to academics from partnering institutions in their respective locations.
- Students will receive dual degrees, one from each institution.
- Students complete their degree and obtain Post Study Work Authorization or Optimal Practical Training upto 24 months in the USA.
- Students will pay a substantially lower overall cost compared to the entirely US programmes.

The details of 2+2 International Collaborative First Degree (UG) Programmes with the above two Universities are given below:

It is planned to admit students in the following four 2+2 International Collaborative undergraduate programmes by the two leading universities from the Academic Year 2024-25 Programs onward:

- B.E. Computer Science at BITS Pilani, India and B.S. Computer Engineering at Iowa State University, Ames, USA

- B.E. Mechanical at BITS Pilani, India and B.S. Mechanical Engineering at Iowa State University, Ames, USA

- B.E. Electrical & Electronics at BITS Pilani, India and B.S. Electrical Engineering at Iowa State University, Ames, USA

- B.E. Electronics & Communication at BITS Pilani, India and B.S. Electrical Engineering at Iowa State University, Ames, USA.

Input Qualification:

(a) BITS Pilani minimum eligibility requirement

Applicant should also fulfil the minimum eligibility requirement of BITS Pilani for admission as follows:

(i) The applicant has passed the 12th examination of 10+2 system from a recognized National/State/International board or its equivalent with Physics, Chemistry and Mathematics (PCM) and adequate proficiency in English; Also, the applicant has obtained a minimum of aggregate 75% marks in PCM in 12th examination, with at least 60% marks in each of the PCM subjects.

(ii) The applicant undertakes the BITS Admission Test (BITSAT) and achieves a score that meets or exceeds the relevant cut-off score for admission to the BITS Award, as determined by BITS from time to time.

(b) Iowa State University minimum eligibility requirement

(i) Applicant should also fulfil the minimum eligibility requirement of Iowa State University for admission as follows:

(ii) Students should have been successfully admitted into the BITS-ISU 2+2 program by meeting its admission requirements as listed in Section (a) above.

(iii) In addition, students must maintain a BITS CGPA of at least 5.75 at the end of their first two years in the program in the BITS portion of the curriculum.

(iv) Students should also meet the English requirements listed below (meet any one of the criteria listed):

>=99 TOEFL or >= 7.5 IELTS or >=130 Duolingo or >=72 PTE or >=600 SAT Reading/Writing or >=26 ACT English

Mode of Admission:

Admissions will be made purely on merit. The merit position of the candidate will be based on the score obtained by the candidate in a Computer based Online Test (BITSAT) conducted by BITS, Pilani. The candidates should also fulfil the essential requirement of a minimum of aggregate **75% marks**

in Physics, Chemistry and Mathematics subjects in the 12th examination with at least 60% marks in each of the Physics, Chemistry, and Mathematics subjects.

Upon successful completion of the BITSAT, students will make their programme selections, which will include the BITS-ISU programmes. Details of applicants who meet BITS admission criteria will be forwarded to Iowa State University for assessment against their eligibility criteria, such as proof of year 12 marks and proof of English language proficiency to the ISU standard.

Admission into the Academy for UAE (Dubai) based offerings will include details of applicants who meet BITS admission criteria and will be forwarded to ISU for assessment against ISU eligibility criteria, such as proof of year 12 marks and proof of English language proficiency to the ISU standard. Students that ISU deems to have met their criteria will be confirmed with BITS. Successful applicants will be provided admission offers.

According to the UGC Regulations mentioned above, dual-degree programmes will be those which are offered by both the Indian and foreign university in the same subject area and at the same qualification level. Degrees will be awarded separately and simultaneously from both universities. Prospective students must meet the admission requirements of both the Indian and Foreign universities and shall apply to and be admitted separately to both universities.

Duration:
The normal duration of the programme will be 8 semesters (Four Semesters and a summer term at any of the Campuses of BITS Pilani and another four Semesters at Iowa State University, Ames, USA).

Internship opportunities and Employment Scenario, etc.

- The program of study at Iowa State includes extensive hands-on experiences in the curriculum and is complemented by both research and employment opportunities during the academic semesters and summer. Engineering students take advantage of internships and cooperative education opportunities that provide paid and supervised work experience to complement formal academic classwork. The College of Engineering Career Services office provides career advising and preparation support for internships, co-ops and post-graduation employment.

- International students on a study visa (F-1) can also pursue off-campus employment opportunities prior to the completion of an academic program or degree by availing of the Curricular Practical Training (CPT), for example for internships and co-ops during the summer or academic semester. Students are eligible for upto 365 days of CPT while completing their bachelor's degree.

- Post-completion Optional Practical Training (OPT) is a 12-month period of work authorization (up to 24 months for engineering fields), or practical training. OPT is an opportunity for F-1 students to take what they learned in the classroom and apply their knowledge to a work setting. Generally, these work experiences are off-campus or for non-student positions at ISU. International students at Iowa State should work with the International Student and Scholar's office on learning more and applying for CPT or OPT.

The four dual degree programmes in collaboration with Iowa State University will be launched in AY 2024-25 as part of the partnership arrangement. The ISU engineering programmes for this partnership are fully accredited by ABET and require capstone projects. These are either industry-sponsored or faculty led research projects. Students will apply their technical knowledge, research, design and professional engineering skills to either discipline-specific, or cross- disciplinary engineering problems, through robust research and established engineering design processes. The degree is internationally recognised, and graduates are able to practice as professional engineers in many countries around the world.

The semester-wise pattern of the following programmes are given in Annexure 2:

- B.E. Computer Science at BITS Pilani, India and B.S. Computer Engineering at Iowa State University, Ames, USA

- B.E. Mechanical at BITS Pilani, India and B.S. Mechanical Engineering at Iowa State University, Ames, USA

- B.E. Electrical & Electronics at BITS Pilani, India and B.S. Electrical Engineering at Iowa State University, Ames, USA

- B.E. Electronics & Communication at BITS Pilani, India and B.S. Electrical Engineering at Iowa State University, Ames, USA.

The collaborative 'dual degree' programmes at the international level are will be offered in collaboration with Iowa State University in the same specialization and at the same qualification level. The general curricular structure for the students admitted under Collaborative Articulation Pathway for BITS-ISU collaborative programmes is given in **Annexure 1.** The semester-wise pattern for students admitted to B.E. Computer Science, B.E. Electronics and Communication and B.E Electrical and Electronics, and B.E Mechanical programmes to be offered under BITS – ISU International Collaborative programmes is given in **Annexures 2(A), (B), (C) and (D)** respectively. 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 alongwith a summer term (if required) at BITS Pilani campuses before getting transferred to Iowa State University in the USA 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 ISU. 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 ISU. The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani and ISU. Accordingly, the ISU credit points will be converted into BITS course units and vice versa by making appropriate equivalency of these courses. The Cross Campus Departmental Committee on Academics (CCDCA) of the respective department will work out all minute details of offering various courses to refine the semesterwise pattern of the respective programme from time to time in consultation with the Dean, AUGS, and will report back to the Senate.

Table 1: Required Category wise structure of each program to fulfill Degree requirement of BITS Pilani for 2+2 International Collaborative First Degree Programmes offered under the BITS-ISU International collaboration

Category	Courses to be offered at BITS Pilani		Courses to be offered at ISU (for BITS Requirement)		Total	
	Courses	Unit	Courses	Eq. Unit*	Courses	Unit
Humanities Elective	(0-3)	(0-9)	(0-3)	(0-9)	3	9
Science Foundation	6 (6)	12 (12)			6	12
Mathematics Foundation	4 (4)	12 (12)			4	12
Engineering Foundation	2 (2)	6 (6)			2	6
Technical Arts	(3-4)	(7-10)	(0-1)	(0-3)	4	10
General Awareness / Professional Courses	2 (2)	6 (6)			2	6
Sub-Total	**(17-21)**	**(43-55)**	**(0-4)**	**(0-12)**	**21**	**55**
Core	(7-11)	(26-37)	(3-8)	(14-24)	(10-16)	(33-48)
Discipline Elective	(0-4)	(0-15)	(0-4)	(0-15)	(4-9)	(12-27)
Sub-Total	**(7-15)**	**(26-52)**	**(3-12)**	**(14-39)**	**(14-20)**	**62**
Open Elective	(0-9)	(0-27)	(0-9)	(0-27)	(5-9)	(15-27)
Capstone Project			2	8	2	8
Grand Total	**(24-32)**	**(69-92)**	**(14-23)**	**(52-68)**	**(46-54)**	**144**

***Equivalent Unit:** Assuming a course of 3-4 units offered at BITS Pilani is equivalent to a 3-4 credit points course offered by ISU. The Unit of each Capstone Project offered at ISU is proposed to be considered equal to 4 units at BITS Pilani. The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani.

Note:

1. Unlike other BITS students of regular 4-year First Degree Programmes, Students of the 2+2 International Collaborative First Degree Programmes need not to register for Practice School or Thesis. Such students will have to complete two Capstone Projects in place of Practice School II or First Degree Thesis to meet the requirements of their degree programmes.

2. Some of the courses which are offered at ISU may have different credit points, the grades earned by the students at ISU will be converted appropriately by making equivalency of the courses and by converting ISU credit points into BITS units, and the CGPA shall be calculated accordingly based on their grades earned in all the respective courses. Senate is requested to authorize the Chairman, Senate, to approve the details of unit mapping of equivalent courses once it is submitted by the Cross-Campus Departmental Committee on Academics (CCDCA) through Dean AUGS for the respective programmes.

3. Table 1 given above describes the general curricular structure for the 2+2 International Collaborative First Degree Programmes offered under the BITS-ISU collaboration. Accordingly, the semesterwise pattern of each specific programme is designed as given in Annexures 2(A), (B), (C) and (D) to fulfil degree requirement of BITS Pilani for BITS-ISU 2+2 Joint International First Degree Programmes.

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

Table 2(A): Semester-wise Pattern for Students Admitted to B.E. Computer Science at BITS Pilani and B.S. Computer Engineering at ISU							
Year	**First Semester**			**U**	**Second Semester**			**U**
I	BIO	F111	General Biology①	3	BIO	F110	Biology Laboratory①	1
	CHEM	F110	Chemistry Laboratory	1	MATH	F112	Mathematics II⑦	3
	CHEM	F111	General Chemistry	3	ME	F112	Workshop Practice	2
	MATH	F111	Mathematics I②	3	MATH	F113	Probability and Statistics⑧	3
	PHY	F110	Physics Laboratory③	1	EEE	F111	Electrical Sciences⑨	3
	PHY	F111	Mechanics, Oscillations and Waves④	3	BITS	F111	Thermodynamics⑩	3
	BITS	F110	Engineering Graphics⑤	2	CS	F111	Computer Programming ⑪	4
	BITS	112	Technical Report Writing ⑥	2				
				18				**19**
Year	**Summer Term**							**U**
			Humanities Elective⑫					3
			Humanities Elective⑬					3
								6
Year	**First Semester**			**U**	**Second Semester**			**U**
II	MATH	F211	Mathematics III ⑭	3	ECON Or MGTS	F211 Or F211	Principles of Economics⑳ Or Principles of Management	3
	CS	F213	Object Oriented Programming ⑮	4	CS	F211	Data Structures & Algorithms㉑	4
	CS	F214	Logic in Computer Science⑯	3	CS	F212	Database Systems㉒	4
	CS	F215	Digital Design⑰	4	CS	F241	Microprocessors & Interfacing ㉓	4
	CS	F222	Discrete Structures for Computer Science⑱	3	CS	F351	Theory of Computation㉔	3
			Humanities Elective⑲	3	BITS	F225	Environmental Studies㉕	3
				20 (min)				**21 (min)**
Year	**First Semester**			**U**	**Second Semester**			**U**
III	CprE	2610	Transfer Orientation	R	ComS	3110	Introduction to the Design and Analysis of Algorithms㉛	3
	CprE	1660	Professional Programming㉖	R	ENGL	3140	Technical Communication㉜	3
	LIB	1600	Introduction to College Level Research	1	ComS	3420	Principles of Programming Languages ㉝	3
	UST	1100	International First-Year Experience Seminar	1	STAT	3300	Probability and Statistics for Computer Science ㉞	3
	CprE	2320	Professional and Ethical Issues in Electrical and Computer Engineering ㉗	3			3000-Level Math Course㉟	4
	ENGL	2500	Written, Oral, Visual, and Electronic Composition㉘	3				
	CprE	3810	Computer Organization and Assembly Level Programming ㉙	4				
	EE	2300	Electronic Circuits and Systems㉚	4				
				16				**16**

Year			First Semester	U			Second Semester	U
Year			First Semester	U			Second Semester	U
IV	CprE	4910	Senior Design Project I and Professionalism ㊱	3	CprE	4920	Senior Design Project II㊵	2
	CprE	4940	Portfolio Assessment	R	CprE	4890	Computer Networks and Data Communication㊶	3
	CprE	3080	Operating Systems: Principles and Practice㊲	4			CprE Elective ㊷	4
	ComS	3090	Software Development Practices ㊳	3	ComS	4400	Principles and Practice of Compiling㊸	3
			CprE Elective ㊴	3				
				13				12

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

Note: Units/Credit points earned for the course(s) in BITS Pilani and ISU 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 144 units with a minimum number of 47 courses (twenty-Nine courses with 84 units (min.) offered by BITS in first two years + Eighteen courses with 60 equivalent units offered by ISU). 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 ISU.
2. To complete the ISU Degree, students need to complete 127 credit points in total (3 waved courses with 12 credit points + 24 mapped courses with 76 equivalent credit points offered by BITS in the first two years + 22 courses with 57 credit points offered by ISU).
3. Upon completion of all BITS Pilani Courses during Years 1 and 2 (including summer term, if any) at a given BITS Campus, students will receive 12+76 = 88 credit points as an ISU credit exemption against the 3 waived + 24 mapped Courses to complete the ISU Degree in accordance with ISU's policies and procedures.
4. Upon completion of all ISU Courses in 3rd and 4th year, students will receive 60 units of transfer credit for the Eighteen 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 ISU.
6. The details of an encircled number given against the selected courses in the semester-wise pattern are given below:

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
⑥	Course BITS F112: Technical Report Writing is a required course to fulfil BITS requirement.
⑦	Course MATH F112: Mathematics II is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2070: Matrices and Linear Algebra to fulfil the ISU requirement.
⑧	Course MATH F113: Probability and Statistics is the compulsory foundation course at BITS. It will be considered as an equivalent to STAT 3050: Engineering Statistics to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
⑨	Course EEE F111: Electrical Sciences is the compulsory foundation course at BITS. It will be considered as an equivalent to EE 2010: Electric Circuit to fulfil the ISU requirement.
⑩	Course BITS F111: Thermodynamics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 2310: Engineering Thermodynamics I, to fulfil the non-CPRE Tech Elective requirement at ISU. Thus, it will fulfill the requirement of 1st course as non-CPRE Tech Elective requirement at ISU.
⑪	Course CS F111: Computer Programming is the compulsory foundation course at BITS. It will be considered as an equivalent to CprE 1850: Introduction to Computer Engineering and Problem Solving I is the foundation course offered at ISU. Both are the foundation courses at the respective Institutes.
⑫	One of the Humanities Elective is a required course at BITS. The course will be considered as an equivalent to one of the General Education Elective to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 2nd course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
⑬	One of the Humanities Elective is a required course at BITS. The course will be considered as an equivalent to one of the General Education Elective to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 3rd course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
⑭	Course MATH F211: Mathematics III is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2670: Elementary Differential Equations and Laplace Transforms, a foundation course offered at ISU. Mathematics I, II and III offered at BITS may fulfill mathematics requirements of ISU.

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
⑮	Course CS F213: Object Oriented Programming is the required core course at BITS Pilani. It will be considered as equivalent to ComS 2270: Object-oriented Programming, a core course offered at ISU.
⑯	Course CS F214: Logic in Computer Science is the required core course at BITS. It will be considered to fulfil as one of the CPRE Comp Think Elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under Computational Thinking Elective out of 3 required at ISU.
⑰	Course CS F215: Digital Design is the required core course at BITS. It will be considered as equivalent to CprE 2810: Digital Logic, a required core course offered at ISU.
⑱	Course CS F222: Discrete Structures for Computer Science is the required core course at BITS. It will be considered as equivalent to CprE 3100: Theoretical Foundations of Computer Engineering, a required core course offered at ISU.
⑲	One of the Humanities Elective is a required course at BITS. It will be considered as an equivalent to one of the General Education Elective to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 4th course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
⑳	ECON F211: Principles of Economics is a compulsory foundation course at BITS, and should be selected to count toward a general education elective category at ISU. It will be considered as an equivalent to ECON 1010: Principles of Microeconomics to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 5th course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
㉑	Course CS F211: Data Structures & Algorithms is the required core course at BITS. It will be considered as equivalent to ComS 2280: Introduction to Data Structures, a required core course offered at ISU. Both are the core courses at the respective Institutes.
㉒	CS F212: Database Systems is the required core course at BITS. It be considered as one of the non-CPRE Tech Elective requirement at ISU. Thus, it will fulfill the requirement of 2nd course as non-CPRE Tech Elective requirement at ISU.
㉓	Course CS F241: Microprocessors & Interfacing is the required core course at BITS. It will be considered as equivalent to CprE 2880: Embedded Systems I, a required core course

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
	offered at ISU. Both are the core courses at the respective Institutes
㉔	Course CS F351: Theory of Computations is a required core course at BITS Pilani. It will be considered as equivalent to ComS 3310: Theory of Computing and will be counted as 2nd Computational Thinking Elective out of 3 required at ISU.
㉕	The course BITS F225: Environmental Studies is a required course under general awareness courses at BITS Pilani. It will be considered as equivalent to ENVS 3340 Environmental Ethics course offered at ISU under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 6th course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
㉖	Course CprE 1660: Professional Programming is the core course offered at ISU. Also, this course will be 1st Open Elective (OPEL) out of total required 5 at BITS.
㉗	Course CprE 2320: Professional and Ethical Issues in Electrical and Computer Engineering is the core course offered at ISU. Also, this course will be treated as 1st Discipline Elective course required at BITS Pilani.
㉘	Course ENGL 2500: Written, Oral, Visual, and Electronic Composition is the core course offered at ISU. Also, this course will be 2nd Open Elective (OPEL) out of total required 5 at BITS.
㉙	Course CprE 3810: Computer Organization and Assembly Level Programming is the core course offered at ISU. Also, this course will be considered as equivalent to CS F342: Computer Architecture a required core course offered at BITS Pilani. Both are the core courses at the respective Institutes.
㉚	Course EE 2300: Electronic Circuits and Systems is the core course offered at ISU. Also, this course will be treated as 2nd Discipline Elective course required at BITS Pilani.
㉛	Course ComS 3110: Introduction to the Design and Analysis of Algorithms is the core course offered at ISU. Also, this course will be considered as equivalent to CS F364: Design and Analysis of Algorithms a required core course offered at BITS Pilani. Both are the core courses at the respective Institutes.
㉜	Course ENGL 3140: Technical Communication would be a course under the requirement of Communication requirement at ISU. Also, will be treated as 3rd Open Elective (OPEL) out of total required 5 at BITS.
㉝	BITS-ISU Students shall be advised to take the course ComS 3420: Principles of

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
	Programming Language as 3rd Computational Thinking Electives out of 3 required at ISU and will be treated as equivalent a required core course offered at BITS, namely CS F301: Principles of Programming Languages.
㉞	Course STAT 3300: Probability and Statistics for Computer Science is the core course offered at ISU. Also, this course will be treated as 4th Open Elective (OPEL) to complete requirements at BITS.
㉟	This course would be a course under the requirement of 3000-Level Math course required at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, will be treated as 5th Open Elective (OPEL) out of total required 5 at BITS.
㊱	Course BITS F456: Capstone Project I is the required course offered at BITS Pilani. Also, this course will be considered as equivalent to the course CPRE 4910: Senior Design Project I and Professionalism. This is the 1st Capstone Project out of 2 required at BITS.
㊲	Course CprE 3080: Operating Systems: Principles and Practice is the core course offered at ISU. Also, this course will be considered as equivalent to CS F372: Operating Systems a required core course offered at BITS Pilani. Both are the core courses at the respective Institutes.
㊳	Course ComS 3090: Software Development Practices is the core course offered at ISU. Also, will be treated as an Extra Open Elective (OPEL) out of total required 5 at BITS.
㊴	This course would be the 1st CprE Electives out of 3 required at ISU. Students should select this course from the pool of CprE electives offered at ISU. Also, will be treated as 3rd Discipline Elective course required at BITS Pilani.
㊵	Course BITS F457: Capstone Project II is the required course offered at BITS Pilani. Also, this course will be considered as equivalent to the course CPRE 4920: Senior Design Project II. This is the 2nd Capstone Project out of 2 required at BITS.
㊶	BITS-ISU Students shall be advised to take the course CprE 4890: Computer Networks and Data Communication as 2nd CprE Electives out of four required at ISU and will be treated as equivalent to a required core course offered at BITS, namely CS F303: Computer Networks.
㊷	This course would be the 3rd CprE Electives out of 3 required at ISU. Students should select this course from the pool of CprE electives offered at ISU. Also, will be treated as 4th

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
	Discipline Elective course required at BITS Pilani.
㊸	BITS-ISU Students shall be advised to take the course ComS 4400: Principles and Practice of Compiling as Technical Electives course required at ISU and will be treated as equivalent to a required core course offered at BITS, namely CS F363: Compiler Construction.

Annexure 2 (B)

Semester-wise Pattern for Students Admitted to B.E. Electronics and Communication at BITS Pilani and B.S. Electrical Engineering at ISU under BITS – ISU 2+2 International Collaborative Programmes

Table 2(B): Semester-wise Pattern for Students Admitted to B.E. Electronics and Communications under BITS – ISU								
Year		**First Semester**		**U**			**Second Semester**	**U**
I	BIO	F110	Biology Laboratory ①	1	BITS	112	Technical Report Writing	2
	BIO	F111	General Biology①	3	MATH	F112	Mathematics II ⑥	3
	CHEM	F110	Chemistry Laboratory	1	ME	F112	Workshop Practice	2
	CHEM	F111	General Chemistry	3	MATH	F113	Probability and Statistics⑦	3
	MATH	F111	Mathematics I②	3	EEE	F111	Electrical Sciences⑧	3
	PHY	F110	Physics Laboratory③	1	BITS	F111	Thermodynamics⑨	3
	PHY	F111	Mechanics, Oscillations and Waves④	3	CS	F111	Computer Programming	4
	BITS	F110	Engineering Graphics⑤	2				
				18				19
Year		**First Semester**		**U**			**Second Semester**	**U**
II	MATH	F211	Mathematics III ⑩	3	ECON Or MGTS	F211 F211	Principles of Economics⑮ Or Principles of Management	3
	ECE	F211	Electrical Machines	4	ECE	F241	Microprocessors & Interfacing	4
	ECE	F212	Electromagnetic Theory ⑪	3	ECE	F242	Control Systems⑯	3
	ECE	F215	Digital Design⑫	4	ECE	F243	Signals & Systems⑰	3
	ECE	F214	Electronic Devices⑬	3	ECE	F244	Microelectronic Circuits	3
	ECE	F314	Electromagnetic Fields & Microwave Engineering	3	BITS	F225	Environmental Studies⑱	3

Table 2(B): Semester-wise Pattern for Students Admitted to B.E. Electronics and Communications under BITS – ISU							
Year			**First Semester**	**U**		**Second Semester**	**U**
			Humanities⑭	3		Humanities Elective⑲	3
				23			**22**
			Summer Term				
	ECE	F341	Analog Electronics				4
	ECE	F344	Information Theory and Coding⑳				3
			Humanities Elective				3
							10
Year			**First Semester**	**U**		**Second Semester**	**U**
III	EE	2610	Transfer Orientation	R	CprE 2880	Embedded Systems I㉓	4
	EE	1660	Professional Programming	R	EE 2320	Professional and Ethical Issues in Electrical and Computer Engineering ㉔	3
	LIB	1600	Introduction to College Level Research	1	PHYS 2320	Introduction to Classical Physics II㉕	4
	UST	1100	International First-Year Experience Seminar	1	ENGL 3140	Technical Communication㉖	3
	EE	4900	Independent Study (CPRE 2810 Lab)	1		3000-Level Math Course ㉗	4
	EE	1850	Introduction to Electrical Engineering and Problem-Solving I	3			
	EE	2300	Electronic Circuits and Systems㉑	4			
	EE	2850	Problem Solving Methods and Tools for Electrical Engineering㉒	4			
	ENGL	2500	Written, Oral, Visual, and Electronic Composition	3			
				17 (min)			**18 (min)**
IV	EE	4910	Senior Design Project I and Professionalism ㉘	3	EE 4920	Senior Design Project II ㉛	2
	EE	4940	Portfolio Assessment	R	EE 4240	Introduction to Digital Signal Processing㉜	4
	EE	3220	Probabilistic Methods for Electrical Engineers	3	CPRE 4890	Computer Networking and Data Communications㉝	4
	EE	3240	Signals and Systems II ㉙	4	EE 4230	Communication Systems Laboratory	1
	EE	3030	Energy Systems and Power Electronics	3		3000-Level Math Course ㉞	4
	EE	3210	Communication Systems I㉚	3			
				16 (min)			**15 (min)**

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

Note: Units/Credit points earned for the course(s) in BITS Pilani and ISU 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 144 units with a minimum number of 46 courses (thirty-two courses with 92 units (min.) offered by BITS in first two years + Fourteen courses with 52 equivalent units offered by ISU). 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 ISU.

2. To complete the ISU Degree, students need to complete 128 credit points in total (3 waved courses with 12 units + 20 mapped courses with 65 equivalent credit points offered by BITS in the first two years + 25 courses with 66 credit points offered by ISU).

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 12+65 = 77 credit points as an ISU credit exemption against the 3 <u>waived</u> + 20 <u>mapped</u> Courses to complete the ISU Degree in accordance with ISU's policies and procedures.
4. Upon completion of all ISU Courses, students will receive 52 units of transfer credit for the 14 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 ISU.
6. The details of an encircled number given against the selected courses in the semester-wise pattern are given below:

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
⑥	Course MATH F112: Mathematics II is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2070: Matrices and Linear Algebra to fulfil the ISU requirement.
⑦	Course MATH F113: Probability and Statistics is the compulsory foundation course at BITS. It will be considered as an equivalent to STAT 3050: Engineering Statistics to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
⑧	Course EEE F111: Electrical Sciences is the compulsory foundation course at BITS. It will be considered as an equivalent to EE 2010: Electric Circuit to fulfil the ISU requirement.
⑨	Course BITS F111: Thermodynamics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 2310: Engineering Thermodynamics I offered at ISU.
⑩	Course MATH F211: Mathematics III is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2670: Elementary Differential Equations and Laplace Transforms, a foundation course offered at ISU. Mathematics I, II and III offered at BITS may fulfill mathematics requirements of ISU.
⑪	Course ECE F212: Electromagnetic Theory is the required core course at BITS. It will be considered as an equivalent to EE 3110: Electromagnetic Fields and Waves a required course offered at ISU.

Symbol	Description
⑫	Course ECE F215: Digital Design is the required core course at BITS. It will be considered as an equivalent to CprE 2810: Digital Logic a required course offered at ISU.
⑬	Course ECE F214: Electronic Devices is the required core course at BITS. It will be considered as an equivalent to EE 3320: Semiconductor Materials and Devices a required course offered at ISU.
⑭	This would be the 1st Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category.
⑮	Course ECON F211: Principles of Economics is the compulsory foundation course at BITS. It will be considered as an equivalent to ECON 1010: Principles of Microeconomics a ECON elective course offered at ISU.
⑯	Course ECE F242: Control Systems is the required core course at BITS. It will be considered as an equivalent to EE 4750: Automatic Control System an EE Elective course offered at ISU.
⑰	Course ECE F243: Signals and Systems is the required core course at BITS. It will be considered as an equivalent to EE 2240: Signals and Systems I is a required course offered at ISU.
⑱	The course BITS F225: Environmental Studies is a required course under general awareness courses at BITS Pilani. This course will be considered as equivalent to ENVS 3340: Environmental Ethics course offered at ISU under General Education Requirement Elective Category.
⑲	This would be the 2nd Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category.
⑳	The course ECE F344: Information Theory and Coding is a required core course offered at BITS Pilani. This course will also fulfill the requirement of a course at ISU offered under EE Elective Category.
㉑	Course EE 2300: Electronic Circuits and Systems is the required course offered at ISU. Also, this course will be treated as 1st Discipline Elective course required at BITS Pilani.
㉒	Course EE 2850: Problem Solving Methods and Tools for Electrical Engineering is the required course offered at ISU. Also, this course will be treated as 2nd Discipline Elective course required at BITS Pilani.
㉓	Course CprE 2880: Embedded Systems I is the required course offered at ISU. Also, this course will be treated as 3rd Discipline Elective course required at BITS Pilani.
㉔	Course EE 2320: Professional and Ethical Issues in Electrical and Computer Engineering is the core course offered at ISU. Also, this course will be 1st Open Elective (OPEL) out of total required 5 at BITS.
㉕	Course PHYS 2320: Introduction to Classical Physics II is the core course offered at ISU. Also, this course will be treated as 2nd Open Elective (OPEL) out of total required 5 at BITS.
㉖	Course ENGL 3140: Technical Communication is the core course offered at ISU. Also, this course will be treated as 3rd Open Elective (OPEL) out of total required 5 at BITS.
㉗	This course would be a course under the requirement of 3000-Level Math course required

Symbol	Description
	at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, this will be treated as 4th Open Elective (OPEL) out of total required 5 at BITS.
㉘	Course BITS F456: Capstone Project I is the required course offered at BITS Pilani. Also, this course can be considered as equivalent to the course EE 4910: Senior Design Project I and Professionalism. This is the 1st Capstone Project out of 2 required at BITS.
㉙	Course EE 3240: Signals and Systems II is the required course offered at ISU. Also, this course will be treated as 4th Discipline Elective course required at BITS Pilani.
㉚	Course EE 3210: Communication Systems I is the EE sequence course offered at ISU. Also, this course can be considered as equivalent to ECE F311: Communication Systems offered at BITS Pilani. Both are the core courses at the respective Institutes.
㉛	Course BITS F457: Capstone Project II is the required course offered at BITS Pilani. Also, this course can be considered as equivalent to the course EE 4920: Senior Design Project II. This is the 2nd Capstone Project out of 2 required at BITS.
㉜	Course EE 4240: Introduction to Digital Signal Processing is the EE/CprE Electives course required at ISU. Also, this course will be treated as equivalent core course offered at BITS, namely ECE F434: Digital Signal Processing.
㉝	Course CPRE 4890: Computer Networking and Data Communications is the EE sequence course offered at ISU. Also, this course will be treated as equivalent core course offered at BITS, namely ECE F343: Communication Networks.
㉞	This course would be a course under the requirement of 3000-Level Math course required at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, this will be treated as 5th Open Elective (OPEL) out of total required 5 at BITS.

Annexure 2(C)

Semester-wise Pattern for Students Admitted to B.E. Electrical and Electronics at BITS Pilani and B.S. Electrical Engineering at ISU under BITS – ISU 2+2 International Collaborative Programmes

Table 2(C): Semester-wise Pattern for Students Admitted to B.E. Electrical and Electronics at BITS Pilani and B.S. Electrical Engineering at ISU								
Year			First Semester	U			Second Semester	U
I	BIO	F111	General Biology①	3	BIO	F110	Biology Laboratory ①	1
	CHEM	F110	Chemistry Laboratory	1	MATH	F112	Mathematics II ⑥	3
	CHEM	F111	General Chemistry	3	ME	F112	Workshop Practice	2
	MATH	F111	Mathematics I②	3	MATH	F113	Probability and Statistics⑦	3
	PHY	F110	Physics Laboratory③	1	EEE	F111	Electrical Sciences ⑧	3
	PHY	F111	Mechanics, Oscillations and Waves④	3	BITS	F111	Thermodynamics⑨	3
	BITS	F110	Engineering Graphics⑤	2	CS	F111	Computer Programming	4
	BITS	112	Technical Report Writing	2				
				18				19
Year			First Semester	U			Second Semester	U
	MATH	F211	Mathematics III ⑩	3	ECON Or MGTS	F211 Or F211	Principles of Economics ⑭ Or Principles of Management	3
	EEE	F211	Electrical Machines	4	EEE	F241	Microprocessors & Interfacing	4
	EEE	F212	Electromagnetic Theory ⑪	3	EEE	F242	Control Systems ⑮	3

Year	First Semester			U	Second Semester			U
	Table 2(C): Semester-wise Pattern for Students Admitted to B.E. Electrical and Electronics at BITS Pilani and B.S. Electrical Engineering at ISU							
Year	**First Semester**			**U**	**Second Semester**			**U**
II	EEE	F215	Digital Design⑫	4	EEE	F243	Signals & Systems⑯	3
	EEE	F214	Electronic Devices⑬	3	EEE	F244	Microelectronic Circuits	3
	MATH	F212	Optimization OR	3	BITS	F225	Environmental Studies⑰	3
	ME	F344	Engineering Optimization	2				
				20				**19**
	Summer Term							
	EEE	F341	Analog Electronics					4
			Humanities Elective⑱					3
			Humanities Elective⑲					3
								10
Year	**First Semester**			**U**	**Second Semester**			**U**
III	EE	2610	Transfer Orientation	R	CprE	2880	Embedded Systems I㉓	4
	EE	1660	Professional Programming	R	EE	2320	Professional and Ethical Issues in Electrical and Computer Engineering ㉔	3
	LIB	1600	Introduction to College Level Research	1	PHYS	2320	Introduction to Classical Physics II㉕	4
	UST	1100	International First-Year Experience Seminar	1	ENGL	3140	Technical Communication㉖	3
	EE	4900	Independent Study (CprE 2810 Lab)	1	EE	3300	Integrated Electronics㉗	4
	EE	1850	Introduction to Electrical Engineering and Problem-Solving I	3				
	EE	2300	Electronic Circuits and Systems⑳	4				
	EE	2850	Problem Solving Methods and Tools for Electrical Engineering㉑	4				
	ENGL	2500	Written, Oral, Visual, and Electronic Composition ㉒	3				
				17 (min)				**18 (min)**
IV	EE	4910	Senior Design Project I and Professionalism㉘	3	EE	4920	Senior Design Project II㉜	2
	EE	4940	Portfolio Assessment	R			3000-Level Math Course㉝	4
	EE	3220	Probabilistic Methods for Electrical Engineers	3			3000-Level Math Course㉞	4
	EE	4650	Digital VLSI Design㉙	3	EE	3030	Energy Systems and Power Electronics㉟	4
	EE	4560	Power System Analysis I㉚	3			EE Elective㊱	3-4
	EE	3210	Communication Systems I ㉛	3				
				15 (min)				**17 (min)**

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

Note: Units/Credit points earned for the course(s) in BITS Pilani and ISU 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 144 units with a minimum number of 46 courses (30 courses with 85 units (min.) offered by BITS in first two years + 16 courses with 59 equivalent units offered by ISU). 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 ISU.

2. To complete the ISU Degree, students need to complete 128 credit points in total (3 waved courses with 12 units + 19 <u>mapped</u> courses with 62 <u>equivalent credit points</u> offered by BITS in the first two years + 25 courses with 66 credit points offered by ISU).

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 12+62 = 74 credit points as an ISU credit exemption against the 3 <u>waived</u> + 19 <u>mapped</u> Courses to complete the ISU Degree in accordance with ISU's policies and procedures.

4. Upon completion of all ISU Courses, students will receive 59 units of transfer credit for the 16 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 ISU.

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

Symbol	Description
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
⑥	Course MATH F112: Mathematics II is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2070: Matrices and Linear Algebra to fulfil the ISU requirement.
⑦	Course MATH F113: Probability and Statistics is the compulsory foundation course at BITS. It will be considered as an equivalent to STAT 3050: Engineering Statistics to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
⑧	Course EEE F111: Electrical Sciences is the compulsory foundation course at BITS. It will be considered as an equivalent to EE 2010: Electric Circuit to fulfil the ISU requirement.
⑨	Course BITS F111: Thermodynamics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 2310: Engineering Thermodynamics I offered at ISU.
⑩	Course MATH F211: Mathematics III is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2670: Elementary Differential Equations and Laplace Transforms, a foundation course offered at ISU. Mathematics I, II and III offered at BITS may fulfill mathematics requirements of ISU.

Symbol	Description
⑪	Course EEE F212: Electromagnetic Theory is the required core course at BITS. It will be considered as an equivalent to EE 3110: Electromagnetic Fields and Waves a required course offered at ISU.
⑫	Course EEE F215: Digital Design is the required core course at BITS. It will be considered as an equivalent to CprE 2810: Digital Logic a required course offered at ISU.
⑬	Course EEE F214: Electronic Devices is the required core course at BITS. It will be considered as an equivalent to EE 3320: Semiconductor Materials and Devices a required course offered at ISU.
⑭	Course ECON F211: Principles of Economics is the compulsory foundation course at BITS. It will be considered as an equivalent to ECON 1010: Principles of Microeconomics a ECON elective course offered at ISU.
⑮	Course EEE F242: Control Systems is the required core course at BITS. It will be considered as an equivalent to EE 4750: Automatic Control System an EE Elective course offered at ISU.
⑯	Course EEE F243: Signals and Systems is the required core course at BITS. It will be considered as an equivalent to EE 2240: Signals and Systems I is a required course offered at ISU.
⑰	The course BITS F225: Environmental Studies is a required course under general awareness courses at BITS Pilani. This course will be considered as equivalent to ENVS 3340: Environmental Ethics course offered at ISU under General Education Requirement Elective Category.
⑱	This would be the 1st Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category.
⑲	This would be the 2nd Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category.
⑳	Course EE 2300: Electronic Circuits and Systems is the required course offered at ISU. Also, this course will be treated as 1st Discipline Elective course required at BITS Pilani.
㉑	Course EE 2850: Problem Solving Methods and Tools for Electrical Engineering is the required course offered at ISU. Also, this course will be treated as 2nd Discipline Elective course required at BITS Pilani.
㉒	The course ENGL 2500: Written, Oral, Visual, and Electronic Composition is the required course offered at ISU. Also, this course will be considered as equivalent to 3rd course under Humanities Elective out of the total 3 courses required at BITS.
㉓	Course CprE 2880: Embedded Systems I is the required course offered at ISU. Also, this course will be treated as 3rd Discipline Elective course required at BITS Pilani.
㉔	Course EE 2320: Professional and Ethical Issues in Electrical and Computer Engineering is the core course offered at ISU. Also, this course will be 1st Open Elective (OPEL) out of total required 5 at BITS.
㉕	Course PHYS 2320: Introduction to Classical Physics II is the core course offered at ISU. Also, this course will be 2nd Open Elective (OPEL) out of total required 5 at BITS.
㉖	Course ENGL 3140: Technical Communication is the core course offered at ISU. Also, this

Symbol	Description
	course will be 3rd Open Elective (OPEL) out of total required 5 at BITS.
㉗	Course EE 3300: Integrated Electronics is the required course offered at ISU. Also, this course will be treated as 4th Discipline Elective course required at BITS Pilani.
㉘	Course BITS F456: Capstone Project I is the required course offered at BITS Pilani. Also, this course can be considered as equivalent to the course EE 4910: Senior Design Project I and Professionalism. This is the 1st Capstone Project out of 2 required at BITS.
㉙	Course EE 4650: Digital VLSI Design is the EE sequence course offered at ISU. Also, this course can be considered as equivalent to a required core EEE F313: Analog & Digital VLSI Design offered at BITS Pilani.
㉚	Course EE 4560: Power System Analysis I is the required course offered at ISU. Also, this course can be considered as equivalent to a required core EEE F312: Power Systems offered at BITS Pilani.
㉛	The course EE 3210: Communication Systems I required to be offered by ISU to fulfill the requirements of BITS. This course will be considered as equivalent to a required core course EEE F311: Communication Systems offered at BITS Pilani.
㉜	Course BITS F457: Capstone Project II is the required course offered at BITS Pilani. Also, this course can be considered as equivalent to the course EE 4920: Senior Design Project II. This is the 2nd Capstone Project out of 2 required at BITS.
㉝	This course would be a course under the requirement of 3000-Level Math course required at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, this will be treated as 4th Open Elective (OPEL) out of total required 5 at BITS.
㉞	This course would be a course under the requirement of 3000-Level Math course required at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, this will be treated as 5th Open Elective (OPEL) out of total required 5 at BITS.
㉟	The course EE 3030: Energy Systems and Power Electronics required to be offered by ISU as an EE Elective at ISU. Also, this course will be considered as equivalent to a required core course EEE F342: Power Electronics offered at BITS Pilani.
㊱	EE Elective (Students will take EE 4570: Power Systems Analysis – II as another EE elective to fufill EE Electives at ISU. It will also facilitates to cover the remaining course content of EEE F342: Power Electronics of BITS which is partially mapped with EE 3030: Energy Systems and Power Electronics.

Semester-wise Pattern for Students Admitted to B.E. Mechanical at BITS Pilani and B.S. Mechanical Engineering at ISU under BITS – ISU 2+2 International Collaborative Programmes

Table 2(D): Semester-wise Pattern for Students Admitted to B.E. Mechanical at BITS Pilani and B.S. Mechanical Engineering at ISU							
Year	**First Semester**			**U**	**Second Semester**		**U**
I	BIO	F111	General Biology①	3	BIO	F110	Biology Laboratory	1
	CHEM	F110	Chemistry Laboratory	1	MATH	F112	Mathematics II ⑥	3
	CHEM	F111	General Chemistry	3	ME	F112	Workshop Practice	2
	MATH	F111	Mathematics I②	3	MATH	F113	Probability and Statistics⑦	3
	PHY	F110	Physics Laboratory③	1	EEE	F111	Electrical Sciences⑧	3
	PHY	F111	Mechanics, Oscillations and Waves④	3	BITS	F111	Thermodynamics⑨	3
	BITS	F110	Engineering Graphics⑤	2	CS	F111	Computer Programming⑩	4
	BITS	112	Technical Report Writing	2				
				18				**19**
Year	**Summer Term**						**U**
			Humanities Elective⑪					3
			Humanities Elective⑫					3
			Humanities Elective⑬					3
								9
Year	**First Semester**			**U**	**Second Semester**		**U**
II	MATH	F211	Mathematics III ⑭	3	ECON Or MGTS	F211 Or F211	Principles of Economics⑲ Or Principles of Management	3
	ME	F211	Mechanics of Solids ⑮	3	ME	F218	Advanced Mechanics of Solids⑳	2
	ME	F212	Fluid Mechanics	3	ME	F221	Mechanisms and Machines㉑	3
	ME	F216	Materials Science & Engineering⑯	3	ME	F315	Advanced Manufacturing Processes	3
	ME	F217	Applied Thermodynamics⑰	4	ME	F316	Manufacturing Management	2
	ME	F219	Manufacturing Processes⑱	4	ME	F317	Engines, Motors, and Mobility	2
					ME	F341	Prime Movers & Fluid Machines	3
					BITS	F225	Environmental Studies㉒	3
				20 (min)				**21 (min)**
Year	**First Semester**			**U**	**Second Semester**		**U**
III	CE	2740	Engineering Statics ㉓	3	EE	4420	Introduction to Circuits and Instruments	2
	ME	2700	Introduction to Mechanical Engineering Design ㉔	3	ME	3450	Engineering Dynamics ㉖	3
	LIB	1600	Introduction to College Level Research	1	ME	3240L	Manufacturing Engineering Laboratory	1
	ME	2020	Mechanical Engineering - Professional Planning	R	EE	4480	Introduction to AC Circuits and Motors ㉗	2
	ENGR	1010	Engineering Orientation	R	ME	3250	Mechanical Component Design㉘	3
	PHYS	2320/L	Introduction to Classical Physics II **+ Laboratory** ㉕	5	ENGL	3140	Technical Communication㉙	3
	ENGL	2500	Written, Oral, Visual, and Electronic Composition	3			3000-Level Math Course ㉚	4
	UST	1100	International First-Year Experience Seminar	1				
				16				**18**

			Table 2(D): Semester-wise Pattern for Students Admitted to B.E. Mechanical at BITS Pilani and B.S. Mechanical Engineering at ISU					
Year			**First Semester**	**U**			**Second Semester**	**U**
IV	AERE	4940	Make to Innovate II ㉛	3	ME	4150	Mechanical Systems Design㊱	3
	ME	4210	System Dynamics and Control ㉜	4	ME	4360	Heat Transfer ㊲	4
	ME	4250	Optimization Methods for Complex Designs ㉝	3	ME	4190	Computer-Aided Design㊳	3
	ME	3700	Engineering Measurements ㉞	3			3000-Level Math Course ㊴	4
	ME	3350	Fluid Flow ㉟	4				
				18				**14**

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

Note: Units/Credit points earned for the course(s) in BITS Pilani and ISU 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 144 units with a minimum number of 49 courses (Thirty-two courses with 87 units (min.) offered by BITS in first two years + Seventeen courses with 57 equivalent units offered by ISU). 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 ISU.

2. To complete the ISU Degree, students need to complete 129 credit points in total (3 waved courses with 12 units + 22 mapped courses with 68 equivalent credit points offered by BITS in the first two years + 24 courses with 65 credit points offered by ISU).

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 12+68 = 80 credit points as an ISU credit exemption against the 3 waived + 22 mapped Courses to complete the ISU Degree in accordance with ISU's policies and procedures.

4. Upon completion of all ISU Courses, students will receive 57 units of transfer credit for the Seventeen 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 ISU.

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

Symbol	**Description**
①	BIO F111: General Biology and BIO F110: Biology Laboratory is the compulsory foundation courses at BITS. These two courses will be considered as an equivalent to BIOL 1010: Introductory Biology to fulfil the general education elective requirement at ISU. Thus, it will fulfill the requirement of 1st course under General Education Requirement Elective out of the total 6 courses required under this category at ISU.
②	MATH F111: Mathematics I is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2650: Calculus III to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
③	PHY F110: Physics Laboratory is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS2310L: Introduction to Classical Physics I Laboratory to fulfil the ISU requirement.
④	PHY F111: Mechanics, Oscillations and Waves is the compulsory foundation course at BITS. It will be considered as an equivalent to PHYS 2310: Introduction to Classical Physics I to fulfil the ISU requirement.

Symbol	Description
⑤	BITS F110: Engineering Graphics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1700: Engineering Graphics and Introductory Design to fulfil the ISU requirement.
⑥	Course MATH F112: Mathematics II is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2070: Matrices and Linear Algebra to fulfil the ISU requirement.
⑦	Course MATH F113: Probability and Statistics is the compulsory foundation course at BITS. It will be considered as an equivalent to STAT 3050: Engineering Statistics to fulfil the ISU requirement. MATH 2650 is considered to fill credit deficiency in ISU Basic Program.
⑧	Course EEE F111: Electrical Sciences is the compulsory foundation course at BITS. It will be considered as an equivalent to EE 2010: Electric Circuit to fulfil the ISU requirement.
⑨	Course BITS F111: Thermodynamics is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 2310: Engineering Thermodynamics I offered at ISU.
⑩	Course CS F111: Computer Programming is the compulsory foundation course at BITS. It will be considered as an equivalent to ME 1600: Mechanical Engineering Problem Solving with Computer Applications a foundation course offered at ISU.
⑪	This would be the 1st Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 2nd course under General Education Requirement Elective out of the total 5 courses required under this category at ISU.
⑫	This would be the 2nd Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 3rd course under General Education Requirement Elective out of the total 5 courses required under this category at ISU.
⑬	This would be the 3rd Humanities Elective (HUEL) out of total required 3 HUELs at BITS. Students should select this course from the pool of Humanities electives (defined for BITS-ISU students) offered at BITS in such a way that the selected course will also fulfill the requirement of a course at ISU offered under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 4th course under General Education Requirement Elective out of the total 5 courses required under this category at ISU.
⑭	Course MATH F211: Mathematics III is the compulsory foundation course at BITS. It will be considered as an equivalent to MATH 2670: Elementary Differential Equations and Laplace Transforms, a foundation course offered at ISU. Mathematics I, II and III offered at BITS may fulfill mathematics requirements of ISU.
⑮	Course ME F211: Mechanics of Solids is the required core course at BITS. It will be considered as an equivalent to EM 3240 Mechanics of Materials a required course offered at ISU.
⑯	Course ME F216: Materials Science & Engineering is the required core course at BITS. It will be considered as an equivalent to MATE 2730 Principles of Materials Science and Engineering a required course offered at ISU.
⑰	Course ME F217: Applied Thermodynamics is the required core course at BITS. It will be considered as an equivalent to ME 3320 Engineering Thermodynamics II a required course

Symbol	Description
	offered at ISU.
⑱	Course ME F219: Manufacturing Processes is the required core course at BITS. It will be considered as an equivalent to ME 3240 Manufacturing Engineering a required course offered at ISU.
⑲	The course ECON F211: Principles of Economics is a required course at BITS Pilani. This course will be considered as equivalent to ECON 1010: Principles of Microeconomics course offered at ISU under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 5th course under General Education Requirement Elective out of the total 5 courses required under this category at ISU.
⑳	Course ME F218: Advanced Mechanics of Solids is the required core course at BITS. It will be considered as an equivalent to EM 4240: Intermediate Mechanics of Materials a required course offered at ISU.
㉑	Course ME F221: Mechanisms and Machines is the required core course at BITS. It will be considered as an equivalent to ME 4160: Mechanism Design and Analysis a required course offered at ISU.
㉒	The course BITS F225: Environmental Studies is a required course under general awareness courses at BITS Pilani. This course will be considered as equivalent to ENVS 3340: Environmental Ethics course offered at ISU under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 5th course under General Education Requirement Elective out of the total 5 courses required under this category at ISU.
㉓	Course CE 2740: Engineering Statics is the core course offered at ISU. Also, this course will be treated as 1st Open Elective (OPEL) out of total required 5 at BITS.
㉔	Course ME 2700: Introduction to Mechanical Engineering Design is the core course offered at ISU. Also, this course will be treated as 1st Discipline Elective course required at BITS Pilani.
㉕	Course PHYS 2320: Introduction to Classical Physics II & course PHYS 2320L: Introduction to Classical Physics II Laboratory are the core courses offered at ISU. Also, these courses will be treated as 2nd Open Elective (OPEL) out of total required 5 at BITS.
㉖	Course ME 3450: Engineering Dynamics is the core course offered at ISU. Also, this course will be treated as 2nd Discipline Elective course required at BITS Pilani.
㉗	Course EE 4480: Introduction to AC Circuits and Motors is a core course offered at ISU. Also, this course will be treated as 3rd Open Elective (OPEL) out of total required 5 at BITS.
㉘	Course ME 3250: Mechanical Component Design is the core course offered at ISU. Also, this course will be considered as equivalent to ME F314: Design of Machine Elements at BITS a, required core course offered at BITS Pilani.
㉙	Course ENGL 3140: Technical Communication would be a course under the requirement of Communication requirement at ISU. Also, will be treated as 4th Open Elective (OPEL) out of total required 5 at BITS.
㉚	This course would be a course under the requirement of 3000-Level Math course required at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, will be treated as 5th Open Elective (OPEL) out of total required 5 at BITS.
㉛	Course AERE 4940: Make to Innovate II is a project-based technical elective course for mechanical engineering students offered at ISU. This will be considered as equivalent to BITS F456: Capstone Project I, which is the required course offered at BITS Pilani. This is the 1st Capstone Project out of 2 required at BITS.

Symbol	Description
㉜	Course ME 4210: System Dynamics and Control is the core course offered at ISU. Also, this course will be considered as equivalent to ME F319: Vibrations and Control a, required core course offered at BITS Pilani.
㉝	The course ME 4250: Optimization Methods for Complex Designs is a required course at ISU. Also, this course will be considered as equivalent to ME F320: Engineering Optimization, a required core course offered at BITS Pilani.
㉞	Course ME 3700: Engineering Measurements is the core course offered at ISU. Also, this course will be treated as 3rd Discipline Elective course required at BITS Pilani.
㉟	Course ME 3350: Fluid Flow is the core course offered at ISU. Also, this course will be treated as 4th Discipline Elective course required at BITS Pilani.
㊱	Course BITS F457: Capstone Project II is the required course offered at BITS Pilani. Also, this course will be considered as equivalent to the course ME 4150: Mechanical Systems Design offered as Capstone Design at ISU. This is the 2nd Capstone Project out of 2 required at BITS.
㊲	Course ME 4360: Heat Transfer is the core course offered at ISU. Also, this course will be considered as equivalent to ME F220: Heat Transfer a required core course offered at BITS Pilani.
㊳	The course ME 4190: Computer-Aided Design required to be offered by ISU as a Technical Elective at ISU. Also, this course will be considered as equivalent to a required core course ME F318: Computer-Aided Design offered at BITS Pilani.
㊴	This course would be a course under the requirement of 3000-Level Math course required at ISU. BITS-ISU students should select this course from the pool of 3000-Level Math courses offered at ISU. Also, will be treated as 6th Open Elective (OPEL) required at BITS.