



**B.E. Electronics and Communication at BITS Pilani and B.S. Electrical Engineering at ISU**

**Program Plan, Semester wise Pattern and Credit Arrangements**

**Schedule A1 – Credit Map detailing**

The collaborative ‘dual degree’ programmes at the international level are being offered in collaboration with Iowa State University in the same specialization and at the same qualification level. 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.

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	F112	Technical Report Writing	2
	BIO	F111	General Biology(1)	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 Statistics(7)	3
	MATH	F111	Mathematics I(2)	3	EEE	F111	Electrical Sciences(8)	3
	PHY	F110	Physics Laboratory(3)	1	BITS	F111	Thermodynamics(9)	3
	PHY	F111	Mechanics, Oscillations and Waves(4)	3	CS	F111	Computer Programming	4
	BITS	F110	Engineering Graphics(5)	2				
			<b>18</b>				<b>19</b>	
Year	First Semester			U	Second Semester			U
II	MATH	F211	Mathematics III (10)	3	ECON Or MGTS	F211 Or F211	Principles of Economics(15) Principles of Management	3
	ECE	F211	Electrical Machines	4	ECE	F241	Microprocessors & Interfacing	4
	ECE	F212	Electromagnetic Theory (11)	3	ECE	F242	Control Systems(16)	3
	ECE	F215	Digital Design(12)	4	ECE	F243	Signals & Systems(17)	3
	ECE	F214	Electronic Devices(13)	3	ECE	F244	Microelectronic Circuits	3
	ECE	F314	Electromagnetic Fields & Microwave Engineering	3	BITS	F225	Environmental Studies(18)	3
				3			Humanities Elective(19)	3
			<b>23</b>				<b>22</b>	
Summer Term								
	ECE	F341	Analog Electronics					4
	ECE	F344	Information Theory and Coding(20)					3
			Humanities Elective					3



Semester-wise Pattern for Students Admitted to B.E. Electronics and Communications under BITS – ISU								
Year	First Semester			U	Second Semester			U
								<b>10</b>
Year	First Semester			U	Second Semester			U
III	EE	2610	Transfer Orientation	R	CprE	2880	Embedded Systems I <sup>(23)</sup>	4
	EE	1660	Professional Programming	R	EE	2320	Professional and Ethical Issues in Electrical and Computer Engineering <sup>(24)</sup>	3
	LIB	1600	Introduction to College Level Research	1	PHYS	2320	Introduction to Classical Physics II <sup>(25)</sup>	4
	UST	1100	International I-Year Experience Seminar	1	ENGL	3140	Technical Communication <sup>(26)</sup>	3
	EE	4900	Independent Study (CPRE 2810 Lab)	1			3000-Level Math Course <sup>(27)</sup>	4
	EE	1850	Introduction to Electrical Engineering and Problem-Solving I	3				
	EE	2300	Electronic Circuits and Systems <sup>(21)</sup>	4				
	EE	2850	Problem Solving Methods and Tools for Electrical Engineering <sup>(22)</sup>	4				
	ENGL	2500	Written, Oral, Visual, and Electronic Composition	3				
			<b>17</b>				<b>18</b>	
IV	EE	4910	Senior Design Project I and Professionalism <sup>(28)</sup>	3	EE	4920	Senior Design Project II <sup>(31)</sup>	2
	EE	4940	Portfolio Assessment	R	EE	4240	Introduction to Digital Signal Processing <sup>(32)</sup>	4
	EE	3220	Probabilistic Methods for Electrical Engineers	3	CPRE	4890	Computer Networking and Data Communications <sup>(33)</sup>	4
	EE	3240	Signals and Systems II <sup>(29)</sup>	4	EE	4230	Communication Systems Laboratory	1
	EE	3030	Energy Systems and Power Electronics	3			3000-Level Math Course <sup>(34)</sup>	4
	EE	3210	Communication Systems I <sup>(30)</sup>	3				
			<b>16</b>				<b>15</b>	

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:

- 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.



- 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).
- 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 waved + 20 mapped Courses to complete the ISU Degree in accordance with ISU's policies and procedures.
- 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.
- The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani and ISU.
- 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 1 <sup>st</sup> 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.
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.



Symbol	Description
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.
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 1 <sup>st</sup> 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 2 <sup>nd</sup> 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 1 <sup>st</sup> 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 2 <sup>nd</sup> 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 3 <sup>rd</sup> 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.



Symbol	Description
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 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 4 <sup>th</sup> 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 1 <sup>st</sup> 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 4 <sup>th</sup> 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 2 <sup>nd</sup> 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 5 <sup>th</sup> Open Elective (OPEL) out of total required 5 at BITS.

