



**B.E. Computer Science at BITS Pilani and B.S. Computer 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. Computer Science at BITS Pilani and B.S. Computer Engineering at ISU									
Year	First Semester				U	Second Semester			U
I	BIO	F111	General Biology <sup>①</sup>	3	BIO	F110	Biology Laboratory <sup>①</sup>	1	
	CHEM	F110	Chemistry Laboratory	1	MATH	F112	Mathematics II <sup>⑦</sup>	3	
	CHEM	F111	General Chemistry	3	ME	F112	Workshop Practice	2	
	MATH	F111	Mathematics I <sup>②</sup>	3	MATH	F113	Probability and Statistics <sup>⑧</sup>	3	
	PHY	F110	Physics Laboratory <sup>③</sup>	1	EEE	F111	Electrical Sciences <sup>⑨</sup>	3	
	PHY	F111	Mechanics, Oscillations and Waves <sup>④</sup>	3	BITS	F111	Thermodynamics <sup>⑩</sup>	3	
	BITS	F110	Engineering Graphics <sup>⑤</sup>	2	CS	F111	Computer Programming <sup>⑪</sup>	4	
	BITS	112	Technical Report Writing <sup>⑥</sup>	2					
				<b>18</b>				<b>19</b>	
Year	Summer Term								U
			Humanities Elective <sup>⑫</sup>					3	
			Humanities Elective <sup>⑬</sup>					3	
Year	First Semester				U	Second Semester			U
II	MATH	F211	Mathematics III <sup>⑭</sup>	3	ECON Or MGTS	F211 Or F211	Principles of Economics <sup>⑳</sup> Or Principles of Management	3	
	CS	F213	Object Oriented Programming <sup>⑮</sup>	4	CS	F211	Data Structures & Algorithms <sup>㉑</sup>	4	
	CS	F214	Logic in Computer Science <sup>⑯</sup>	3	CS	F212	Database Systems <sup>㉒</sup>	4	
	CS	F215	Digital Design <sup>⑰</sup>	4	CS	F241	Microprocessors & Interfacing <sup>㉓</sup>	4	
	CS	F222	Discrete Structures for Computer Science <sup>⑱</sup>	3	CS	F351	Theory of Computation <sup>㉔</sup>	3	
				Humanities Elective <sup>⑲</sup>	3	BITS	F225	Environmental Studies <sup>㉕</sup>	3
				<b>20</b>				<b>21</b>	



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
Year	First Semester				U	Second Semester				U
III	CprE	2610	Transfer Orientation	R	ComS	3110	Introduction to the Design and Analysis of Algorithms <sup>31</sup>			3
	CprE	1660	Professional Programming <sup>26</sup>	R	ENGL	3140	Technical Communication <sup>32</sup>			3
	LIB	1600	Introduction to College Level Research	1	ComS	3420	Principles of Programming Languages <sup>33</sup>			3
	UST	1100	International First-Year Experience Seminar	1	STAT	3300	Probability and Statistics for Computer Science <sup>34</sup>			3
	CprE	2320	Professional and Ethical Issues in Electrical and Computer Engineering <sup>27</sup>	3			3000-Level Math Course <sup>35</sup>			4
	ENGL	2500	Written, Oral, Visual, and Electronic Composition <sup>28</sup>	3						
	CprE	3810	Computer Organization and Assembly Level Programming <sup>29</sup>	4						
	EE	2300	Electronic Circuits and Systems <sup>30</sup>	4						
				<b>16</b>						<b>16</b>
Year	First Semester				U	Second Semester				U
IV	CprE	4910	Senior Design Project I and Professionalism <sup>36</sup>	3	CprE	4920	Senior Design Project II <sup>40</sup>			2
	CprE	4940	Portfolio Assessment	R	CprE	4890	Computer Networks and Data Communication <sup>41</sup>			3
	CprE	3080	Operating Systems: Principles and Practice <sup>37</sup>	4			CprE Elective <sup>42</sup>			4
	ComS	3090	Software Development Practices <sup>38</sup>	3	ComS	4400	Principles and Practice of Compiling <sup>43</sup>			3
			CprE Elective <sup>39</sup>	3						
					<b>13</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 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.
- To complete the ISU Degree, students need to complete 127 credit points in total (3 waived 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).
- Upon completion of all BITS Pilani Courses during U 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 3<sup>rd</sup> and 4<sup>th</sup> 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 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 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



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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.
	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 2 <sup>nd</sup> 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 3 <sup>rd</sup> 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.
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 1 <sup>st</sup> 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 4 <sup>th</sup> course under General Education Requirement



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.
	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 5 <sup>th</sup> 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 2 <sup>nd</sup> 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 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 2 <sup>nd</sup> 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 ENV5 3340 Environmental Ethics course offered at ISU under General Education Requirement Elective Category. Thus, it will fulfill the requirement of 6 <sup>th</sup> 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 1 <sup>st</sup> 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 1 <sup>st</sup> Discipline Elective course required at



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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.
	BITS Pilani.
②⑧	Course ENGL 2500: Written, Oral, Visual, and Electronic Composition is the core course offered at ISU. Also, this course will be 2 <sup>nd</sup> 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.
③⑩	Course EE 2300: Electronic Circuits and Systems is the core course offered at ISU. Also, this course will be treated as 2 <sup>nd</sup> 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 3 <sup>rd</sup> 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 Programming Language as 3 <sup>rd</sup> 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 4 <sup>th</sup> 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 5 <sup>th</sup> 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



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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.
	will be considered as equivalent to the course CPRE 4910: Senior Design Project I and Professionalism. This is the 1 <sup>st</sup> 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 1 <sup>st</sup> 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 3 <sup>rd</sup> 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 2 <sup>nd</sup> 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 2 <sup>nd</sup> 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 3 <sup>rd</sup> 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 4 <sup>th</sup> 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.