



BITS Pilani
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Rensselaer

B.E. Mechanical at BITS Pilani and B.S. in Mechanical Engineering at RPI

Program Plan, Semester wise Pattern and Credit Arrangements

Schedule A1 – Credit Map detailing

The collaborative 'dual degree' programmes at the international level are proposed to be offered in collaboration with Rensselaer Polytechnic Institute in the same specialization and at the same qualification level. The general curricular structure and semester-wise pattern for the students admitted under Collaborative Articulation Pathway for BITS-RPI collaborative programmes is given in **Table 1**. To fulfil the requirements, a few new courses may be introduced later, if required.

In this 4-year collaborative 'dual degree' programme, students will spend the first two years along with a summer term (if required) at BITS Pilani campuses before getting transferred to Rensselaer Polytechnic Institute 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 RPI. The actual units mapping of the courses shall be decided based on the equivalent courses offered at BITS Pilani and RPI. Accordingly, the RPI credit points will be converted into BITS course units and vice versa by making appropriate equivalency of these courses.



Table 1: Semester-wise Pattern for Students Admitted to B.E. Mechanical at BITS Pilani and Bachelor of Science in Mechanical Engineering at RPI under BITS – RPI 2+2 International Collaborative Programmes

Semester-wise Pattern for Students Admitted to B.E. Mechanical under BITS – RPI								
Year	First Semester			U	Second Semester			U
	BIO	F101	Introduction to Biological Sciences ①	3	ME	F112	Workshop Practice ⑥	2
	CHEM	F101	Fundamentals of Chemistry ②	3	BITS	F111	Thermodynamics ⑦	3
	MATH	F101	Multivariable Calculus ③	3	CS	F111	Computer Programming ⑧	4
	PHY	F101	Oscillations and Waves ④	3	EEE	F111	Electrical Sciences ⑨	3
	BITS	F234	Introduction to Engineering Design ⑤	4	MATH	F102	Linear Algebra and Complex Variables ③	3
	BITS	F101	Navigating Campus Life and Living Well ⑫	1	MATH	F113	Probability and Statistics ⑩	3
	BITS	K101	Physical Fitness, Health Well-being and Creative Arts ⑫		BITS	F112	Technical Report Writing ⑪	2
					BITS	F102	Innovation and Design Thinking ⑫	1
				17				21
Summer Term								
Humanities Elective ⑬								3
Humanities Elective ⑭								3
Year	First Semester			U	Second Semester			U
II	MATH	F211	Mathematics III ⑮	3	ECON	F211	Principles of Economics ⑳	3
	ME	F211	Mechanics of Solids ⑯	3	ME	F218	Advanced Mechanics of Solids ㉓	2
	ME	F216	Materials Science and Engineering ⑰	3	ME	F219	Manufacturing Processes ㉔	4
	ME	F217	Applied Thermodynamics ⑱	4	ME	F220	Heat Transfer ㉕	4
	ME	F212	Fluid Mechanics ⑲	3	ME	F221	Mechanisms and Machines ㉖	3
	ME	F316	Manufacturing Management ㉔	3	BITS	F225	Environmental Studies ㉗	3
	ME	F317	Engines, Motors, and Mobility ㉕	2	ME	F318	Computer-Aided Design ㉘	3
				21				22
Year	First Semester			U	Second Semester			U
III	ENGR	2090	Engineering Dynamics ㉙	4	ADMN-	1030	Arch Exploration & Planning ㉚	0
	HASS		HASS Core Elective ㉚	4	MANE	2220	Inventor's Studio 1 (w/ PD1) ㉛	4
	MANE	2110	Numerical Methods & Programming ㉛	3	MANE	4500	Modeling & Control of Dynamic Systems ㉜	3
	PHYS	1200	Physics II ㉜	4	STSO	4100	Prof. Dev. 2: Tech. Issues & Solutions ㉝	2
	MANE	4160	Vibrations ㉞	3	MANE	4040	Mechanical Systems Laboratory ㉞	2
					MANE	4740	Thermal & Fluids Engineering Laboratory ㉟	2
					MANE	496x	Rotordynamics ㊱	3
					HASS		HASS Core Elective ㊲	4
				18				20
Year	First Semester			U	Second Semester			U



Semester-wise Pattern for Students Admitted to B.E. Mechanical under BITS – RPI								
Year	First Semester			U	Second Semester			U
IV	ENGR	4010	Prof. Dev.: Leadership Competencies ⁽⁴⁰⁾	1	SoE/S	4....	Technical Elective II ⁽⁴⁶⁾	3
	MANE	4510	Control Systems Laboratory ⁽⁴¹⁾	2	SoE/S	4....	Technical Elective III ⁽⁴⁷⁾	3
	MANE	4....	Computation Elective ⁽⁴²⁾	3	SoE/S	4....	Technical Elective IV ⁽⁴⁸⁾	3
	MANE	4030	Elements of Mechanical Design (Technical Elective I) ⁽⁴³⁾	3	SoE/S	4....	Technical Elective V ⁽⁴⁹⁾	3
	MANE or 4220	4260	Multidisciplinary Capstone Design or Inventor's Studio 2 ⁽⁴⁴⁾	3			Free Elective ⁽⁴⁵⁾	4
	HASS		HASS Core Elective ⁽⁵⁰⁾	4				
				16				16

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

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

Symbol	Description
①	Course BIO F101: Introduction to Biological Sciences is a required course at BITS Pilani. It will be considered as equivalent to BIOL 1010: Introduction to Biology & BIOL 1015: Introduction to Biology Laboratory at RPI.
②	Courses CHEM F101: Fundamentals of Chemistry is required course at BITS Pilani. It will be considered equivalent to CHEM 1100: Principles of Chemistry I, a required course at RPI.
③	Courses MATH F101: Multivariable Calculus I and MATH F102: Linear Algebra and Complex Variables are required courses at BITS Pilani. In combination, they will be considered equivalent to MATH 2010: Multivariable Calculus and Matrix Algebra, a required course at RPI.
④	Courses PHY F101: Oscillations and Waves is required courses at BITS Pilani. It will be considered equivalent to PHYS 1100: Physics I, a required course at RPI.
⑤	Course BITS F234: Introduction to Engineering Design is a required course at BITS Pilani. It will be considered equivalent to ENGR 2050: Introduction to Engineering Design, a required course at RPI.
⑥	Course ME F112: Workshop Practice is a required course at BITS Pilani. It will be considered equivalent to ENGR 1300: Engineering Processes, a required course at RPI.
⑦	Course BITS F111: Thermodynamics is a required course at BITS Pilani. It will be considered equivalent to MANE 1000: MANE Elective at RPI.
⑧	Course CS F111: Computer Programming is a required course at BITS Pilani. It will be considered equivalent to CSCI 1100: Computer Science I at RPI.
⑨	Course EEE F111: Electrical Sciences is a required course at BITS Pilani. It will be considered equivalent to ECSE 2010: Electric Circuits at RPI.



⑩	Course MATH F113: Probability and Statistics is a required course at BITS Pilani. It will be considered equivalent to ENGR 2600: Modeling and Analysis of Uncertainty, a required course at RPI.
⑪	Course BITS F112: Technical Report Writing is a required course at BITS Pilani. It will be considered equivalent to COMM 1000: Communications Elective at RPI.
⑫	Course BITS F101: Navigating Campus Life and Living Well, course BITS K101: Physical Fitness, Health Well-being and Creative Arts, and course BITS F102: Innovation and Design Thinking are the required courses at BITS Pilani. These will be offered to meet the graduation requirements of BITS Pilani only.
⑬	The course is required to offered to fulfill Humanities Elective Requirement at BITS Pilani and RPI. This would be the 1st Humanities Elective (HUEL) out of total required 3 HUEs.
⑭	The course is required to offered to fulfill Humanities Elective Requirement at BITS Pilani and RPI. This would be the 2nd Humanities Elective (HUEL) out of total required 3 HUEs.
⑮	Course MATH F211: Mathematics III is a required course at BITS Pilani. It will be considered equivalent to MATH 2400: Introduction to Differential Equations, a required course at RPI.
⑯	Course ME F211: Mechanics of Solids is a required course at BITS Pilani. It will be considered equivalent to MANE 2000: MANE Elective at RPI.
⑰	Course ME F216: Materials Science and Engineering is a required course at BITS Pilani. It will be considered equivalent to ENGR 1600: Materials Science for Engineers, a required course at RPI.
⑱	Course ME F217: Applied Thermodynamics is a required course at BITS Pilani. It will be considered equivalent to MANE 2710: Thermodynamics, a required course at RPI.
⑲	Course ME F212: Fluid Mechanics is a required course at BITS Pilani. It will be considered equivalent to MANE 2720: Fluid Mechanics, a required course at RPI.
⑳	Course ME F316: Manufacturing Management is a required course at BITS Pilani. It will be considered equivalent to MANE 2000: MANE Elective at RPI.
㉑	Course ME F317: Engines, Motors, and Mobility is a required course at BITS Pilani. It will be considered equivalent to MANE 2000: MANE Elective at RPI.
㉒	ECON F211: Principles of Economics is required at BITS Pilani. It will be considered equivalent to INQR 1200: Principles of Economics at RPI.
㉓	Course ME F218: Advanced Mechanics of Solids is a required course at BITS Pilani. It will be considered equivalent to ENGR 2530: Strength of Materials, a required course at RPI.
㉔	Course ME F219: Manufacturing Processes is a required course at BITS Pilani. It will be considered equivalent to ENGR 2710: General Manufacturing Processes at RPI.
㉕	Course ME F220: Heat Transfer is a required course at BITS Pilani. It will be considered equivalent to MANE 4730: Heat Transfer, a required course at RPI.
㉖	Course ME F221: Mechanisms and Machines is a required course at BITS Pilani. It will be considered equivalent to MANE 4180: Mechanisms at RPI.
㉗	Course BITS F225: Environmental Studies is a required course at BITS Pilani. It will be considered equivalent to STSO 2300: Environment and Society at RPI.



28	Course ME F318: Computer-Aided Design is a required course at BITS Pilani. It will be considered equivalent to MANE 2000: MANE Elective at RPI.
29	Course ENGR 2090: Engineering Dynamics is the required course offered at RPI. Also, this will be considered as the 1st Open course out of 5 required courses at BITS.
30	This course would be the 1st HASS Core Elective out of the total required 3 courses under this category at RPI. This would also be considered as the 2nd Open Elective course out of 5 required at BITS. Students should select this course from the pool of HASS Core electives offered at RPI.
31	Course MANE 2110: Numerical Methods & Programming is the required course offered at RPI. Also, this will be considered as the 1st Discipline Elective course out of 4 required courses at BITS.
32	Course PHYS 1200: Physics II is the required course offered at RPI. Also, this will be considered as the 3rd Open course out of 5 required courses at BITS.
33	Course STSO 4100: Prof. Dev. 2: Tech. Issues & Solutions is the required course offered at RPI. It will be offered to meet graduation requirements of RPI only.
34	Course ADMN 1030: Arch Exploration & Planning is the required course offered at RPI. It will be offered to meet graduation requirements of RPI only.
35	Course MANE 2220: Inventor's Studio 1 (w/ PD1) is a required course offered at RPI that fulfills the Engineering Design Elective at RPI. This course is equivalent to BITS F456: Capstone Project I to be offered at BITS Pilani/
36	Course MANE 4500: Modeling & Control of Dynamic Systems is the required course offered at RPI and course MANE 4160: Vibrations is required to be offered by RPI to complete graduation requirements of BITS. Also, these two courses will be combinedly considered as equivalent to two BITS courses, viz., (i) ME F319: Vibrations and controls a required core course at BITS Pilani and (ii) 2nd Discipline course out of 4 required courses at BITS.
37	Course MANE 4040: Mechanical Systems Laboratory is the required course offered at RPI. Also, this will be considered as the 3rd Discipline course out of 4 required courses at BITS.
38	Course MANE 4740: Thermal & Fluids Engineering Laboratory is the required course offered at RPI and course MANE 496x: Rotordynamics is required to be offered by RPI to complete graduation requirements of BITS. Also, these two courses will be combinedly considered as equivalent to two BITS courses, viz., (i) ME F341: Prime Movers & Fluid Machines a required core course at BITS Pilani and (ii) Also, this will be considered as the 4th Discipline course out of 4 required courses at BITS.
39	This course would be the 2nd HASS Core Elective out of the total required 3 courses under this category at RPI. This would also be considered as the 4th Open Elective course out of 5 required at BITS. Students should select this course from the pool of HASS Core electives offered at RPI.
40	Course ENGR 4010: Prof. Dev.: Leadership Competencies is the required course offered at RPI. It will be offered to meet graduation requirements of RPI only.



④①	Course MANE 4510: Control Systems Laboratory is the required course offered at RPI. Also, this course will be considered as an extra discipline elective to complete the credit/unit requirements at BITS Pilani.
④②	BITS-RPI students are advised to take the Course MANE 4280: Numerical Design Optimization compulsorily. This course would be considered as Computation Electives offered at RPI. Also, this course will be considered as equivalent to ME F320: Engineering Optimization a required core course offered at BITS Pilani.
④③	BITS-RPI students are advised to take the Course MANE 4030: Elements of Mechanical Design compulsorily. This course would be considered as 1st Technical Electives out of 5 required at RPI. Also, this course will be considered as equivalent to ME F314: Design of Machine Element a required core course offered at BITS Pilani.
④④	Either MANE 4260: Multidisciplinary Capstone Design or MANE 4220: Inventor's Studio 2 are required at RPI to meet capstone design requirements. Both of these courses are equivalent to BITS F457: Capstone Project II to be offered at BITS Pilani. All BITS-RPI students have to do two Capstone Projects in place of Practice School II/Thesis.
④⑤	BITS-RPI students are advised to take the Course MANE 4640: Analysis of Manufacturing Processes compulsorily. This course would be considered as Free Elective at RPI. Also, this course will be considered as equivalent to ME F315: Advanced Manufacturing Process a required core course offered at BITS Pilani.
④⑥	BITS-RPI students are advised to take any one Course from the list of SoE/S Technical Electives offered at RPI. This course would be considered as 2nd Technical Electives out of 5 required at RPI. This would also be considered as the 5th Open Elective course out of 5 required at BITS.
④⑦	BITS-RPI students are advised to take any one Course from the list of SoE/S Technical Electives offered at RPI. This course would be considered as 3rd SoE/S Technical Electives out of 5 required at RPI. It will be considered as an extra open elective to meet the graduation requirements at BITS Pilani.
④⑧	BITS-RPI students are advised to take any one Course from the list of SoE/S Technical Electives offered at RPI. This course would be considered as 4th SoE/S Technical Electives out of 5 required at RPI.
④⑨	BITS-RPI students are advised to take any one Course from the list of SoE/S Technical Electives offered at RPI. This course would be considered as 5th Technical Electives out of 5 required at RPI.
⑤⑩	This course would be the 3rd HASS Core Elective out of the total required 3 courses under this category at RPI. This would also be considered as the 3rd Humanities Elective (2 Humanities Electives will be completed at BITS Pilani during first two years) course out of 3 required at BITS. Students should select this course from the pool of HASS Core electives offered at RPI.